VOL. XLVII. No. 1

FEBRUARY 8th, 1945

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An early place is justifiably given to the famous Halifax III in this new advertisement series depicting military and Civil Aircraft powered by "Bristol" Hercules Aero Engines. This World-renowned Handley-Page bomber continues to leave its devastating trail throughout the length and breadth of enemy-occupied territory, and has proved itself as one of the most powerful factors contributing to Allied air supremacy. The HALIFAX III is powered by four "Bristol" Hercules sleeve-valve radial engines. The high performance made possible by "Bristol" sleeve-valve engines in this, and other first-line bombers, gives support to the assertion that the single sleeve-valve will be the principle behind the power of large civil planes too.

Bristol

The single sleeve-valve principle was pioneered & developed by "Bristol"

THE BRISTOL AEROPLANE COMPANY LIMITED

FLIGHT
and
AIRCRAFT ENGINEER

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The Outlook

All-weather Air War

AS time goes on, one problem after another connected with military flying is solved, and we get nearer to an ability to conduct a 24-hour air war every day. But there is still a long way to go. During last month weather defeated the air forces of the belligerents on over 50 per cent. of the days.

When one remembers the extraordinary spirit, skill and equipment of the Royal Air Force, it seems ungrateful to appear dissatisfied. Yet undoubtedly the most urgent requirement to-day is that the aircrews must be able to fly, find and hit their targets and return to base at any time of the day or night, in whatever weather and in whatever latitude they may find themselves.

The war has been full of instances in which specialised experience, knowledge, equipment and training have given one side or the other distinct advantages. In North Africa, for example, our age-long tropical and desert experience and training gave the R.A.F. a tremendous advantage over the German and Italian air forces. At the same time, however, it was left to the Germans to prove to us that tanks could be used in the midday heat of midsummer in Libya. The German High Command then made the same mistake themselves by not realising the possibilities of offensive warfare in the sub-zero temperatures of a Russian winter. (One day it will be realised how near Germany was to complete defeat in the first winter offensive by the Russians.)

Coming to more recent events, had the tactical air forces on the Western Front been able to operate in fog—this is not so far from a possibility as might be imagined—then surprise attacks such as that in the Ardennes would have no future. Again, if our Bomber Command had been able to overcome the handicaps of the recent severe weather in England, we could have given invaluable help to the Russians in their magnificent attack which has been carried out in temperatures many degrees lower than anything we ever experience in this country.

Aids to navigation, bombing through ten-tenths cloud by instruments, de-icing equipment, all help to solve the problem. Nevertheless, it is only by exerting every effort in aircraft design, airfield layout, radiolocation and its host of associated uses, such as radio altimeters, that the mechanics of the problem can be solved. The most vital part of all, of course, is training. More can be done in this way with present equipment than in any other single direction.

Air Freight

THERE does not appear to be general agreement concerning the question of specialised aircraft or mixed cargo. On balance, operators seem inclined to regard favourably the compromise represented by the mixed cargo, at any rate for a start and on most routes. There is one aspect of air transport, however, which does call initially for specialised design, the freight aircraft. In the case of passengers and mails, speed is one of the most important considerations. Air freight, on the other hand, is always so much faster than surface transport that even relatively modest speeds may suffice, at least in those parts of the world where surface transport is not very highly developed.

Beginning with this issue we are publishing an article by Mr. W. S. Shackleton on cargo aircraft, in which he examines some of the many problems in his own whimsical way. The next instalment will deal more specifically with the new Bristol Freighter, the first announcement of which caused considerable fluttering in the dovecotes on account of its estimated operating cost of one shilling per ton-mile.

In a recent issue we published the views of Major

Mayo on the cost of air transport. The picture he painted of passenger aircraft was somewhat sombre, and may have erred a little on the pessimistic side, although we do not consider that it did so unduly (there has been far too much wishful thinking tending towards the other extreme). He did state, however, that for air freight the figures might be somewhat better.

At the National Air Cargo Meeting of the American Society of Automotive Engineers held in Chicago last December, Dr. Robert Nebesar, vice-president and chief engineer of the Universal Moulded Products Corporation, presented a paper on efficiencies in cargo aircraft design. He went into the study very thoroughly, and examined several designs for three different engine sizes and four different wing loadings. His studies led him to certain interesting conclusions. He did not think, obviously speaking with American conditions in mind, that stages much under 500 miles would be worth while in view of the pick-up and delivery by lorries at terminals. In Europe it is conceivable that somewhat shorter stages would have to be operated. He also reached the conclusion that for maximum efficiency the wing loading should not exceed 20 lb. to 26 lb. per square foot, and that these figures should be coupled with take-off power loadings of 15 lb. to 11.5 lb. per horse-power. These figures indicate relatively low cruising speeds. We mention these figures because the wing and power loadings of the Bristol Freighter (to be published next week) fall inside Nebesar's limits. Thus it would appear that aircraft designers so far separated as Bristol, England, and Bristol, Virginia, having examined the problems thoroughly, have come to the same general conclusions. Nebesar, however, plumps for a tricycle undercarriage so as to give a level floor at about the height of a lorry, and also prefers loading through a door at the rear.

Joining Hands

THERE have been times, before the meeting of the three leaders at Teheran, when Marshal Stalin's allusions to the British and American bombing offensive in the West smacked rather of the frame of mind known as "damning with faint praise." The faintness of his enthusiasm was not directed against the way in which the bomber offensive was conducted, but implied fairly obviously that he was not much of a believer in strategic air action. What he wanted was an Allied army assailing Germany's West Front.

Well, that was what we all wanted to see; and now it is happening. What we should like to know is the Russian Marshal's heartfelt reaction to the latest move by the western heavy bombers. The latest bombing raids on Berlin have not been strategical, but were obviously a tactical intervention in the great battle raging all along the line of the Oder. For the Germans everything depends on their ability to move reinforcements and reserves about with ease; and that means the unimpeded use of the railway lines and stations in Berlin. The capital is crowded with millions of refugees, and it is reported that they have been forbidden to move out to the west for fear of impeding the movement of troop trains.

At that moment the British and American heavy bombers struck with full strength at the lines and stations in Berlin. No blow could have been more timely and Marshal Stalin must be thinking that it was a good thing that the Anglo-Saxons had learnt their way about Berlin.

It was a delightful touch when the American escort fighters flew on to watch the flashes of the Russian guns beyond the Oder. Air power has at last united East and West.

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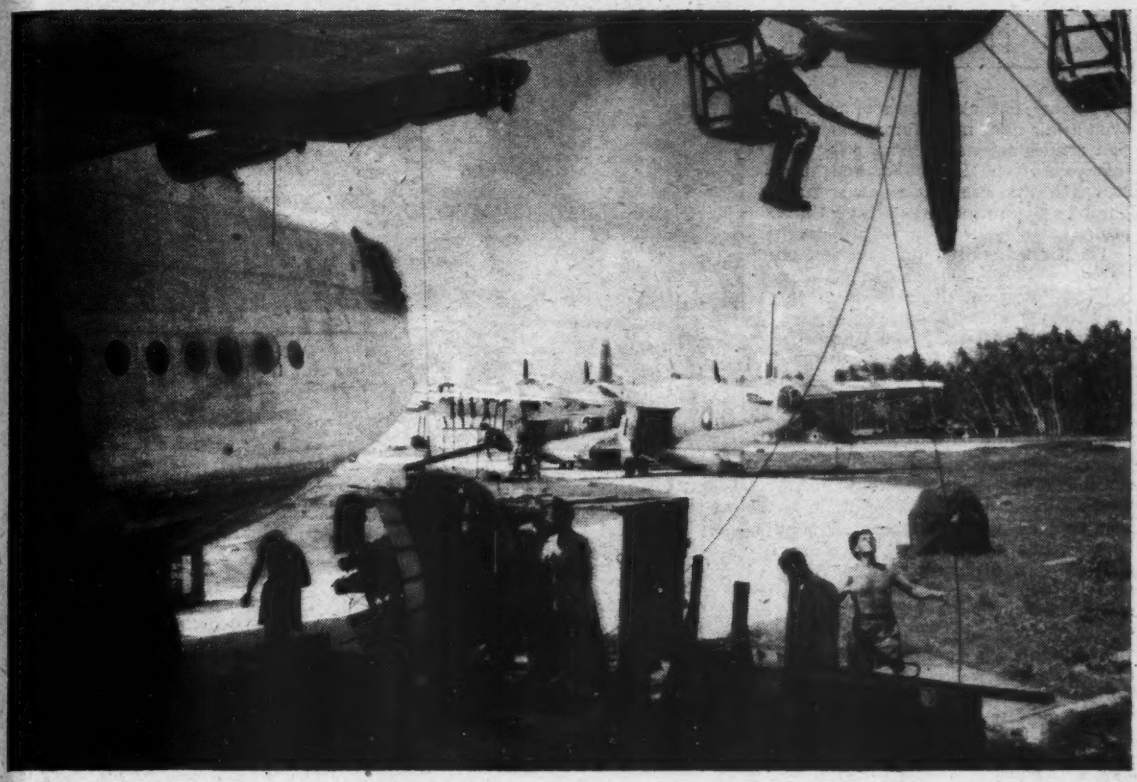
THE NTH. VARIANT: A Coastal Command Mosquito with rocket rails fitted under the wings. The rails are an earlier pattern than those shown on page 140, having double instead of single runways.



FOR INDIAN OCEAN PATROLS: Short Sunderlands beached and undergoing overhaul at an R.A.F. flying-boat base in Ceylon.

WAR in the AIR

Refugees, 1940 and 1945 : Russia's Debt to Anglo-American Air Offensive : Japanese Air Quietude in Luzon

BY the time these words are published it may be known to all whether Marshal Zhukov intends to continue his dash on Berlin and seize the Reich Capital, or whether his objective is Stettin. Many military commentators think that to capture Stettin and so reach the Baltic would be the better strategy. Berlin would be a glittering prize, but the days are past when Generals need to consider the political effect of capturing a city on the allies of Germany or on neutrals. Germany now has no allies except Japan, and the Japanese are too much concerned with the future fate of Tokyo to bother much about what happens to Berlin. Such neutrals as there are have long since realised that Germany has lost the war; and so there is no need to think of impressing them.

The inhabitants of Berlin are evacuating the city in long streams, mainly by roads to the west. The more simple-minded of them may still be full of terror of the "Bolshevik barbarians" about whom their leaders have been so eloquent. Others, more sophisticated, may think of the atrocities which German armies have committed in Russia and Poland, and feel that if the Russians were ruthless in their treatment of Germans, the latter would have thoroughly deserved it. "Conscience makes cowards of us all."

We wonder if any Germans remember the tragic flight of refugees from Holland and Belgium in 1940, and how the *Luftwaffe* deliberately machine-gunned the long lines of fugitives on the choked roads. The Russians could easily send aircraft to do the same on the roads out of Berlin, and if they did so there is little doubt that the German wireless would tell the world about it. Not a word of the sort has been uttered. In barbarism the German race still stands alone.

We have been told by the Germans themselves that there has been a massing of the *Luftwaffe* on the Eastern Front. It cannot amount to much. By this time the Russian lines of communication are very long and must be very tenuous. We do not know how far they have been able to use captured railways and German rolling stock; but much of the supplies must go by road. There should be good targets for an active and potent *Luftwaffe*, and its activities might call a halt to the Russian lightning advance. In any case it would not be surprising to hear that the Soviet Generals had outrun their supplies, and were obliged to reduce their pace while they built up the stores of food and ammunition. They may be taking risks; but there is no hint that the *Luftwaffe* has been doing anything to slow up the invaders. For that the Russians have to thank the air offensive of the British and Americans in the West, which first drove the enemy to adopt the policy of sacrificing offence for defence (by reducing the production of bombers in order to increase the outturn of fighters), and secondly made such a dead set against fighter factories that

WAR IN THE AIR

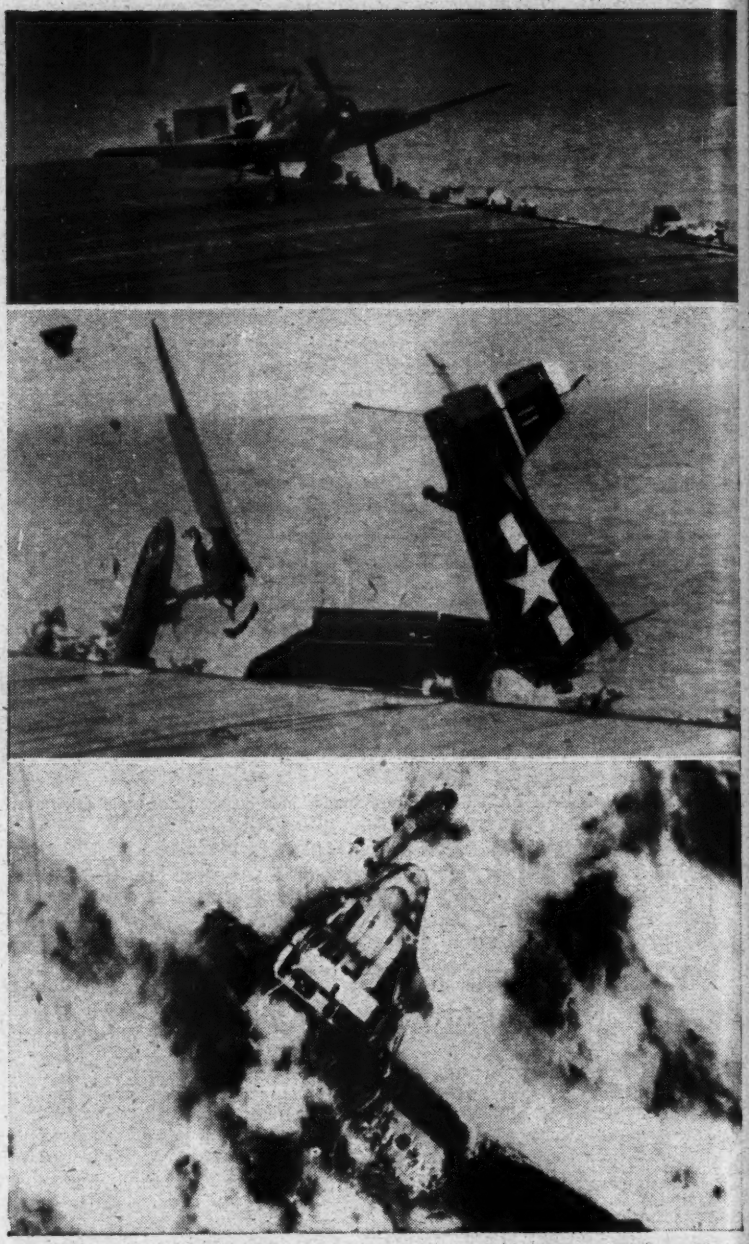
the enemy lost all chance of making even a fair fight in the air. The Russian armies are now profiting by this paralysis of the *Luftwaffe*, and they are free to use their own large numbers of Stormoviks as they think best.

The Germans seem to have got so imbued with the idea that a "hedgehog" is a useful disposition in war that there are now thousands of German troops scattered about Europe in defensive posts which the Allies have not yet troubled to reduce. They must all fall into our hands sooner or later. Among them most people have almost forgotten the Atlantic ports on the Bay of Biscay. It seemed sensible for the Germans to hang on to Nazaire and the rest of them so long as they could be used as U-boat bases. But the U-boats have now mostly retired to Bergen. When General Patton and his 3rd Army swept round the flank of the main German forces in France and drove them out of the country, he, naturally, did not waste time over the ports. The French Forces of the Interior were left to invest them to the best of their ability. The F.F.I. are short of heavy guns and other things, but the Germans in the ports are isolated, with no earthly chance of joining up with Rundstedt's men, or of doing anything more than making local nuisances of themselves. The Royal Navy occasionally bombarded the fortifications at first, and at one time Bomber Command paid a certain amount of attention to them.

A French Air Force

NOW a new body has been formed, named the French Atlantic Air Command, which intends to continue the work of bombing the defences of the ports. It seems to be the first sign of a revival of the *Armée de l'Air*, and we all hope that it will in time grow in size and power. The countrymen of Georges Guynemer are grand in the air when they are equipped with up-to-date aircraft; and such, no doubt, will be given to the new Command.

Referring to the massing of the *Luftwaffe* on the Eastern Front, the arrival of a substantial number is reported from Moscow; but with the comment that the Russian air ascendancy has not been shaken. Great credit is given to the Russian fighter known as the Yak 9F, by which the German airfields are kept in subjection. On Feb. 1st the Russian High Command announced that 26 enemy aircraft had been shot down the day before in air combat or by A.A. fire. That is not a very large number, and the reason most probably is that not very many German pilots tried to challenge the Russian advance.



CHEATING DAVY JONES: A graphic series of three photographs showing a U.S. Navy Hellcat, flown by Ensign Myers, going over the side of a carrier after returning from an operation over the Philippines. He touched down outside the arrester gear with one wheel over the edge. The aircraft disintegrated and Ensign Myers went into the sea with the front part. In the bottom picture he is seen swimming away—unhurt.

It is with rather mingled feelings that we hear the news that Superfortresses from India have sunk the floating dock at Singapore. We British were so proud when the monster, weighing 50,000 tons, was towed out from Britain and erected in what we looked upon as the key point of our naval power in the East. Of course, when Singapore fell, the dock was scuttled; but the Japanese raised it again, and described the feat as "one of the greatest salvage feats in history." Well, we certainly do not want the enemy to have the use of it.

The Americans have made more landings in Luzon, without opposition, and have thrust forward to Manila. The Japanese Air Force is evidently now the most incompetent of all the forces engaged in the world war. If it cannot fight, one would at least expect it to reconnoitre and report the approach of American transports.

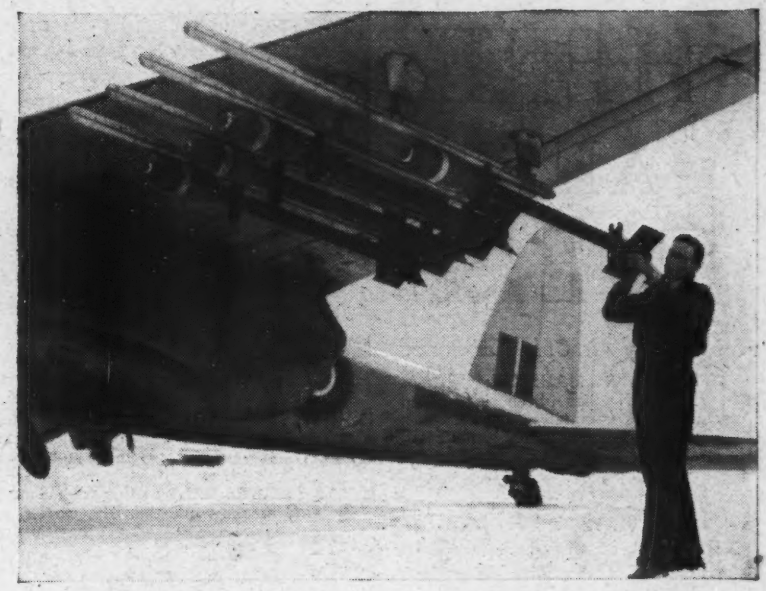
Rocket Mosquito

Coastal Command Punish Enemy Shipping Off Norway with the Latest Variant of De Havilland's Famous Fighter-bomber

AGAINST land targets the rocket has been mostly in demand for short-range tactical work by day, for which a single-engine fighter was obviously the most suitable aircraft; the outstanding success of the rocket Typhoons against tanks and troop concentrations in the Falaise Gap was a classic example.

Against shipping, however, longer operating range, a navigator, more elaborate navigational radio and the safety of two engines are necessary. Rocket rails have therefore been fitted to several multi-engine types, the Beaufighter and now the Mosquito because of its high speed.

A steady "platform" is necessary for accurate rocket launching because of the relatively low speed at which the rocket leaves the aircraft. The Mosquito, which always attacks in a dive, provides the steadiness that is wanted, and has another good feature in the pilot's excellent view. It carries the usual eight rockets with 60 lb. heads—and the lightness of this form of armament enables advantage to be taken of the extra fuel tankage which is a feature of every Mosquito version. The absence of gun weight and recoil are distinct advantages of the rocket projectile over the 57 mm. gun carried by other Mosquitoes, although the high muzzle velocity of the shell of the latter greatly aids accuracy. The rocket projectile is ten times as heavy as the six-pounder shell, but fewer of the rockets can be carried, their number being limited by the number of rails that can be accommodated.



Fitting 60-lb. headed rockets into the port rails of a Mosquito. It will be noticed that these rails are of a later type with single, instead of double, runners. The rails are sighted in such a manner that a perfect shot should give hits below, on and above the waterline.

A feature of the Mosquito attacks is the confusion caused by the anti-flak firing with their 20 mm. cannon shells and machine gun bullets, while the rockets are being launched, giving a very clean sweep of the enemy's decks. The mixed grill is sometimes improved by a few 500 lb. bombs and some six-pounder shells from other fighter-bomber Mosquitoes all flying in the same strike force. The cannon-equipped Mosquitoes are fighters in their own right and nasty customers for enemy fighters to tackle.

CHANGES IN HIGHER COMMANDS

JUST as we are about to go to press with this issue certain changes in the Higher Commands of the R.A.F. are announced by the Air Ministry. Air Marshal Sir Keith Park, K.C.B., M.C., D.F.C., has been appointed Air Commander-in-Chief, South East Asia, in place of the late Sir Trafford Leigh-Mallory, who was lost with others on a flight when about to take up his new post. Air Marshal Sir Guy Garrod, who has been acting in command, will take up another high appointment not yet disclosed.

Air Vice-Marshal C. E. H. Medhurst, C.B., O.B.E., has been appointed Air Officer Commanding-in-Chief, Middle East Command, in place of Air Marshal Park.

Air Chief Marshal Sir Frederick Bowhill will soon be relinquishing his post as Air Officer Commanding-in-Chief of Transport Command. He will be succeeded by Air Vice-Marshal R. A. Cochrane, C.B., C.B.E., A.F.C.

Air Marshal Sir Keith Park has been A.O.C.-in-C., Middle East Command, since January, 1944. During the Battle of Britain he was A.O.C., No. 11 Group of Fighter Command. Once upon a time we was C.O. of the Oxford University Air Squadron. He is a New Zealander. Air Vice-Marshal Medhurst has been commandant of the R.A.F. Staff College since 1943, and before that he was Assistant Chief of the Air Staff. Air Vice-Marshal Cochrane has been Air Officer Commanding various groups in Bomber Command since September, 1942.

GOOD STAFF WORK

UNDER the chairmanship of Mr. D. L. Hollis-Williams, chief engineer, the drawing office of the Fairey Aviation Co., Ltd., held a staff dinner at Frascatis Restaurant last Friday. It was the first of the kind and very well attended. A sign of the times was the number of ladies among the drawing office staff. If good feeling and cameraderie are a criterion of efficient team work, then Fairey products will assuredly live up to the reputation of the long line of notable aircraft bearing that famous name. Naturally, the staff generally are appreciative and refreshed by the recent prominence accorded to the Barracuda and the Firefly, which are doing such good work for the Silent Service. Mr. Hollis-Williams announced that the company has produced seven war types of aircraft, and in an inspiring address paid just tribute to the team spirit displayed.

BALLOON COMMAND DISBANDED

LAST Monday, February 5th, Sir Archibald Sinclair, Secretary of State for Air, said farewell to Balloon Command. He explained that this did not mean that balloons would no longer rise (he said "fly"), but that they would be under other Commands of the Royal Air Force.

GOVERNMENT AIRLINE OWNERSHIP

LAST week, in our report on the R.Ae.S. debate on civil aviation, due to a misunderstanding, we ascribed to Mr. T. A. Rice, London manager of Pan American Airways, an expression which he did not actually use in his concluding remarks. What he did say was: "That is the case against the American surface transport companies participating in civil aviation, as it appears to me. Naturally, I have assumed that our airlines will continue to be privately owned, no matter who operates them."

HERE AND THERE

FOR SAILORS ONLY: Aircraft had to be lashed to the flight deck and protected by wind breaks while this U.S. carrier, rolling as much as 27½ degrees, fought its way through a storm.

New Deputy Air Chief for Burma

ACTING AIR MARSHAL W. A. CORYTON has been appointed Assistant Air Commander of the Eastern Air Command, it has been announced. He is also Air Marshal Commanding the R.A.F. in Bengal and Burma.

Going Home

RELATIVES and friends of Australian airmen in Canada, says the R.A.A.F. *Newsletter*, have been notified not to send any more parcels abroad as almost all members of the R.A.A.F. in Canada will soon be returning to Australia.

Flight Refuelling Changes

MR. C. H. LATIMER-NEEDHAM, lately with A. V. Roe and Co., Ltd., has joined Sir Alan Cobham as chief engineer of Flight Refuelling, Ltd. Mr. G. E. Percival, until recently with Hawker Aircraft, has been appointed technical manager.

Post-war Choice

A QUESTIONNAIRE to 13,500 Canadian airmen on their ambitions as to post-war careers reveals that only 111 are interesting in remaining airmen, according to a statement by Air Vice Marshal J. A. Sully, member of the Air Council for Personnel.

Air Vice-Marshal at 36

GROUP CAPTAIN H. A. CONSTANTINE, awarded the D.S.O. in September, 1942, has been granted the acting rank of Air Vice-Marshal in the R.A.F. at the age of 36.

To-night

A LECTURE on the principles of construction, adjustment and operation of hydromatic airscrews has been arranged by the Society of Licensed Aircraft Engineers, to be given to-night at Whitchurch Airport, Bristol, by Mr. L. R. Barker.

It will be illustrated by a sound film, and the meeting is timed for 7 p.m.

A Brighter R.Ae.S.

WITH its January, 1945, issue, the *Journal of the Royal Aeronautical Society* appears in brighter guise. For one thing, the covers are printed in colour, and the contents, too, are less "heavy" than they used to be.

A particularly interesting announcement discloses the fact that the Prime Minister has accepted Honorary Fellowship of the Society.

An article by Capt. Pritchard recalls that the first annual report of the Society, which was formed in 1866, was published in 1867, while the first issue of the *Journal* appeared in January, 1897.

In a Good Cause

THE V.1 exhibition which was held a short time ago in aid of the London Federation of Boys' Clubs at the showrooms of Rootes, Ltd., Piccadilly, resulted in a net sum of £2,432 being handed over to the Federation.

This was raised entirely by voluntary contributions from visitors, no entrance fee to the exhibition being charged.

Hermes Engines

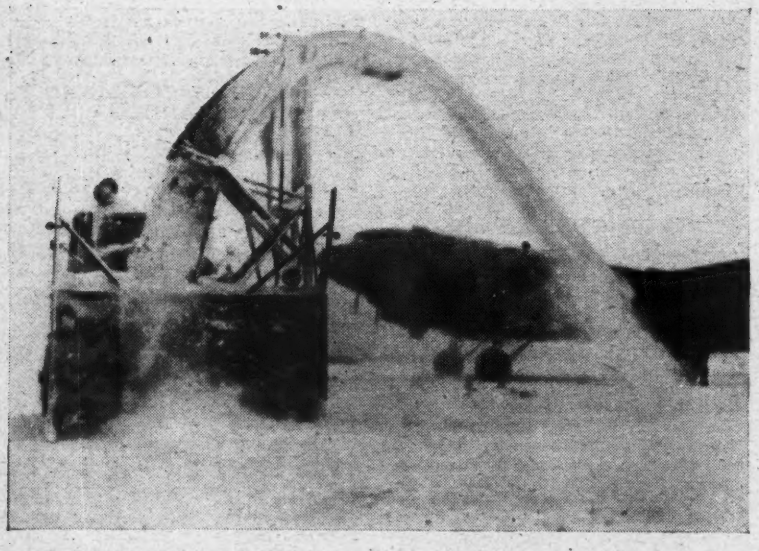
BLACKBURN AIRCRAFT, LTD. (Cirrus Engine Division), announce that owing to obsolescence and also to the loss of jigs and tools due to various war causes, Hermes engines types II, IIB, IV and IVA will no longer be serviced by the firm, nor can further spares be provided. Cirrus Minor and Cirrus Major engines are not affected, and servicing of these will continue. When Government control is removed, these latter will be available for civil use.

Camouflage

WING CDR. T. R. CAVE-BROWN-CAVE will lecture to the Royal Society of Arts at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, on Wednesday, February 14th. The subject will be "Camouflage for the Protection of Civil Factories and its Application to Peace-time Purposes"; Air Marshal Sir Richard Peck will take the chair. The lecture starts at 5.30 p.m.

Well-earned Awards

TWO awards in the New Year Honours may well have escaped the notice of the British aviation world. One was the Commendation for Valuable Service in the Air, posthumously awarded to



ROLLING UP THE CARPET: This new type of snowplough rapidly clears a Dutch runway of its thick carpet of snow, for R.A.F. Dakotas bringing casualties back to England.

HERE AND THERE

John Crosby Warren in recognition of his gallant work on many occasions when testing jet-propelled aircraft.

The other was a M.B.E. awarded to Mr. A. N. Clifton, who has been right-hand man to Mr. J. Smith, Supermarine's chief designer, and has helped him throughout the development of the many versions of the Spitfire.

Back Again

GRP. CAPT. C. S. MORICE, D.S.O., M.C., has rejoined the Dunlop Rubber Co., Ltd., to take up duties in the Aviation Division.

He will act as a liaison with the R.A.F. on technical and maintenance matters associated with aircraft tyres.

U.S. "Jet" Development

ACCORDING to a recent issue of the American magazine *Newsweek*, the U.S.A.A.F. is developing an improved and much faster jet-propelled aircraft which is "so far ahead of the recently announced Airacomet that production of the latter will taper off."

But, the magazine added, the new aircraft may not be ready before the end of hostilities in Europe.

Delco-Remy Changes

NEW appointments, as follows, are announced by Delco-Remy and Hyatt, Ltd., consequent upon the resignation, after nearly eighteen years' service, of Mr. G. Keith Drew, their sales director, who is to join Frigidaire, Ltd., in a similar capacity.

Mr. E. G. Wright, secretary, becomes director and secretary; Mr. S. H. Blazey, chief designer, becomes director and chief designer; and Mr. C. H. Charles becomes general sales manager.

"Southern Cross" to Fly Again

THE historic three-engined Fokker monoplane, *Southern Cross*, used by the late Air Comdre. Sir Charles Kingsford Smith on many of his most famous flights, and which has been stored for the past ten years in a hangar at Canberra, is to fly again.

It will be featured in a film on the life of "Smithy," now being made by Cinesound Productions, Australia.

Capt. (formerly Wing Cdr.) G. U. Allen, now with B.O.A.C. in London, who flew with "Smithy" on many of his record-breaking ventures, carried out a thorough examination of the veteran Fokker before it was decided to use it for actual flying sequences in the film, and found it to be still in excellent condition.

Extending Their Round

THE European Division U.S.A.A.F. Air Transport Command, has extended its flight service into Italy, Corsica and Sardinia, following the transfer of several installations from the North African division to the European division.

The division's flying routes now run from the northern section of the United Kingdom through France to Southern Italy.

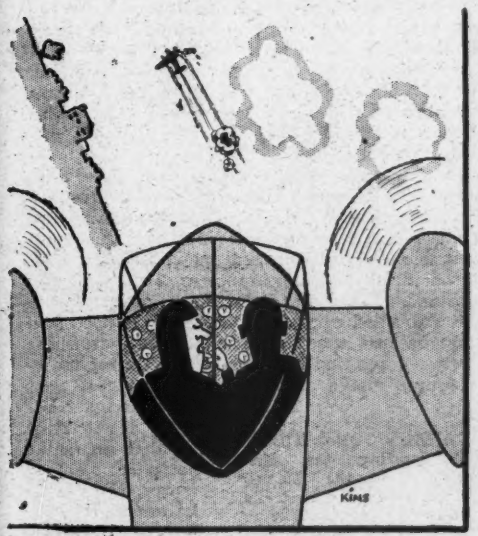
Lord Reith's Tour

THE tele-communications of the British Commonwealth are to be investigated by Lord Reith, who recently left Britain for this purpose in R.A.F. Transport Command's famous Liberator, *Commando*, accompanied by Sir Edward Herbert, director-general of the Postal and Telegraph Censorship Department, and Sir Stanley Angwin, assistant director of the G.P.O. (see above picture).

Altogether some 70,000 miles will be covered on this official world tour, and the *Commando* has been slightly modified to provide an office and comfortable seating for the passengers. A berth has also been installed.

The flight will follow Transport Command routes via The Azores, Washington, San Diego, Honolulu, Sydney, Wellington (N.Z), Canberra, Perth, Colombo, New Delhi, Aden, Nairobi, Salisbury, Pretoria, Cape Town, Accra, Trinidad, Montreal and Ottawa.

Air Chief Marshall Bowhill sees Lord Reith off on his world tour in the Liberator, *Commando*, from a British airfield. (See adjoining paragraph.)



"Right—now, what were you saying?"

R.A.F. Glider Pilots

R.A.F. pilots from the large pool produced by the Commonwealth Air Training Plan are to be used as glider pilots in airborne operations.

In announcing this new arrangement, the Air Ministry says that the turning of powered aircraft pilots into glider pilots presented certain problems, but, thanks to keenness and willingness among all concerned—Army and R.A.F.—the conversion has been achieved in a few weeks when it might have taken months. It does not foreshadow the disbandment of the Glider Pilot Regiment.

A.T.C.'s Fourth Birthday

A SPECIAL message from Marshal of the Royal Air Force Sir Charles Portal was read at A.T.C. parades last week-end to mark the fourth birthday of the Corps.

Saying that the A.T.C. had made "a decisive contribution towards victory," Sir Charles added, "Our tremendous air superiority over the enemy, secured at great price, has meant that the present need for new air crews is less. But the time will come when the R.A.F. will again welcome every fit young man the corps can train, for the A.T.C. is firmly established as an integral part of our air training organisation."

Incidentally, over 100,000 A.T.C. cadets have joined the R.A.F. during the past four years, and in addition, thousands more have gone into the Fleet Air Arm. More than 25,000 have entered the flying Services during the past twelve months alone.

General Aircraft Decontrolled

AS the result of "considerable reorganisation" of the affairs of General Aircraft, Ltd., the appointment of an authorised controller for this firm made by the Minister of Aircraft Production early in 1943 has now been revoked and Messrs. R. C. Rootes and A. L. Goate, who were elected to the board at that time, have now resigned.

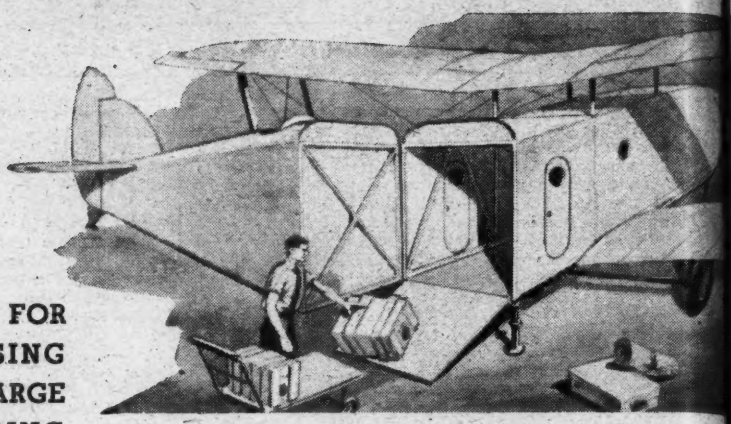
This was announced at the recent annual general meeting by the chairman of the company, Sir Maurice Bonham Carter, who added that Mr. L. G. Reid, also elected to the board and appointed managing director at the time of the emergency, would continue to act as managing director, Rootes Securities, Ltd., having generously relinquished their call on his services for this purpose. Continuity of management would thus be preserved.

"Following a period of great difficulty," said Sir Maurice, "production is now on an even keel and the demands of the Government supply departments are being maintained on a satisfactory programme."

Cargo Aircraft

By W. S. SHACKLETON

FEATURES WHICH MAKE FOR ECONOMY : HIGH CRUISING SPEED UNNECESSARY : LARGE CARGO HOLD AND LOADING HATCHES ESSENTIAL



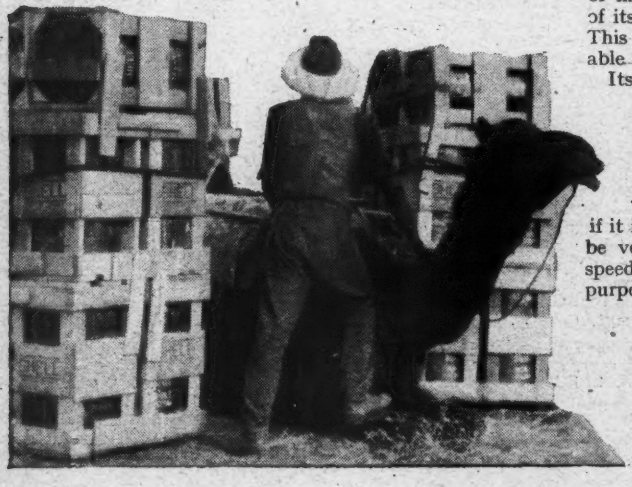
The 1922 Gloster "Goods Carrying" aircraft designed by Mr. H. P. Folland. Its goods load was 1,600 lb.; cruising speed, 92 m.p.h.; engine, a 360 h.p. Rolls-Royce Eagle.

For I dipt into the future, far as human eye could see;
Saw the Vision of the World, and all the wonder that would be;
Saw the heavens fill with commerce, argosies of magic sails,
Pilots of the purple twilight, dropping down with costly bales;
Till the war-drum throbb'd no longer, and the battle-flags were furl'd,
In the parliament of man, the federation of the world.
ALFRED LORD TENNYSON ("Locksley Hall," 1854).

TENNYSON wrote it over ninety years ago! We never held a Poet's Licence, but it seems good poetry to us. It shows sound common sense, too, and vision greater than Jules Verne's.

Note! The cargo aircraft to which Alfred refers had a payload of *costly bales*. Tennyson knew there was no point in carrying lumber, coal, sand or politicians by air. Such commodities, non-perishable, have no urgency and are of low specific value.

If Tennyson had lived to join the Board of B.O.A.C. (of course he would have been getting on a bit by now) he would have recommended such urgent and costly bales as boots and shoes, leather goods, clothing, newspapers, watches and jewellery, choice flowers, oysters, carpets, medical supplies, hardware, confectionery, bicycles, race-horses and eggs. He would have taken motor cars complete with passengers and luggage from Lympne to Le Touquet, from Leith to Oslo and from Liverpool to Dublin. And, of course, vice versa! He would have brought by air, caviare from Astrakhan, trout from Norway, sea-otter pelts from Kamchatka, and perhaps even lobsters from Juan Fernandez. By air freight would have come pearls from Thursday Island, gold from New Guinea, and diamonds from Kimberley. British requisites for hunting, shooting and fishing—always the best in the world—Tennyson would have sent by air. So would have gone urgent automobile, aircraft and machinery spares, tyres, instruments, films, and a thousand and one other things including, of course passengers' excess luggage, anything, indeed, valued at more than, say, £200 per ton, providing the distance was not too great.



CAMEL - TON - MILES : Transporting the Shell petrol for the Mackay Expedition in Australia. It cost 15/- per gall. to get the fuel to the dumps by this method.

Poet's Perspicuity

Similarly, had Tennyson lived to be a member of the Brabazon Committee would he not have included at least *one* freight aircraft among the imposing list of British civil passenger air liners? Of course he would! Indeed, he would have had three assorted sizes—two twin-engined machines and a big four-engined one. He would have argued that we would not attempt to build up our shattered Merchant Marine with cruising liners only. Horace, our Tame Stressman, says Tennyson would not have been so daft as all that!

Now to be *really* good a freight aircraft must be designed as a freight aircraft. You can carry freight in a bomber or in an air liner, but you cannot do it efficiently. Similarly, you can carry cargo in a battleship or a passenger liner, but you cannot do it efficiently. What are the chief requirements of a freight aircraft? In the first place it must have a big cargo hold with large doors or hatches to facilitate loading and unloading. The ratio of its payload to its cruising horse-power must be high. This is of more importance than the ratio of its disposable load to its total weight.

Its airframe and its engines must be simple and robust, easy to service and maintain. It must be *most* economical to run. It should be readily convertible into a seaplane or a skiplane. It should be capable of carrying passengers on occasion. Its external finish and appearance are relatively unimportant. Remember it is a cargo aircraft, and if it is a bit slab-sided what does it matter? It need not be very fast because speed costs money. A cruising speed of between 140 and 150 m.p.h. will do for most purposes because above all other things its cost per ton-mile must be low. If it can do that on, say, 40 per cent. power, there will be ample reserve for use against head winds.

THE writer of this article has been designing, building, operating and selling aircraft since the last war. At times—as he says—he has even descended to writing about them, assisted, of course, by Horace, his Tame Stressman. He has made a study of freight aircraft and their problems in many countries, notably New Guinea and Canada.

Four of the five Ford tri-motored machines which were in this country were bought by him for Guinea Airways, Ltd. They were adapted for carrying freight by stripping the furnishings and fitting a large hatch in the roof.

During 1940-41, as consultant to M.A.P., Mr. Shackleton was associated with Dr. Roxbee Cox in the development of large transport gliders. Since then, as consultant to the great Tata group of companies, he has taken a great interest in aviation developments in India.

Compared with other forms of transport it will be very fast, anyway. To make a given aircraft go twice as fast would require something like eight times the power and, therefore, about four times the petrol per mile.

Let us make it cruise at 145 m.p.h. just for the sake of argument. That means a low wing loading and a low landing speed. In turn these make for greater safety during take-off and landing, smaller and cheaper landing fields and less wear and tear on tyres and brakes. At such a speed we need not bother to fit a retractable undercarriage. The saving in weight, cost and maintenance, and the added safety and reliability, would more than compensate for the extra few miles an hour to be gained by retracting. With a fixed undercarriage it is easier to convert to skis or floats. You get a shorter take-off.

Built-in Headwinds

"But," some readers will argue, "145 miles an hour, slab sides and a fixed undercarriage! Isn't that a return to the days of wood and string and built-in head winds? Why not 290 miles an hour, beautiful curves and a retractable undercarriage?"

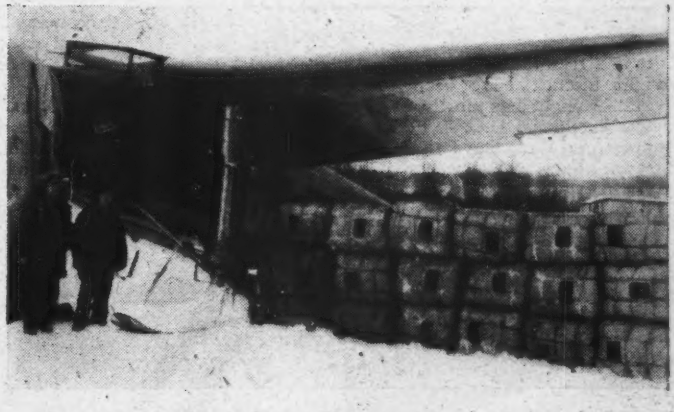
Well, the answer is that such a machine could be designed now and some day *will* be designed, but bearing in mind present-day demands and economic conditions, and existing power plants, it would fail in certain essential requirements. It would cost more to buy and to maintain. It would require bigger and better airfields, and it would cost more to carry one ton for one mile, even if it travelled that mile in half the time. You have to load and unload a tramp aircraft and during that time it is earning nothing—indeed, it is eating its head off. A big slab-sided freighter can be loaded in less time than a highly curved and streamlined machine. At least that seems a reasonable thought to us. As our Horace says: "What is the use of spending thirty minutes (or so) more on the ground in loading and unloading and then saving half an hour (or so) in the air?"

High speed is expensive largely because it requires heavy and costly engines using enormous quantities of expensive fuel. The annual petrol bill alone can easily exceed the first cost of the aircraft. Take a well-known and very efficient twin-engined aircraft which we may assume will cost about £27,500. In 4,000 hours of operation at 100 gallons per hour and at 1s. 6d. per gallon it will consume £30,000 worth of fuel as well as some thousands of pounds' worth of oil. As soon as we have light and powerful jet engines capable of burning ships' oil with the thermal efficiency of a modern piston engine, then the 400 m.p.h. freighter will become a practical design proposition!

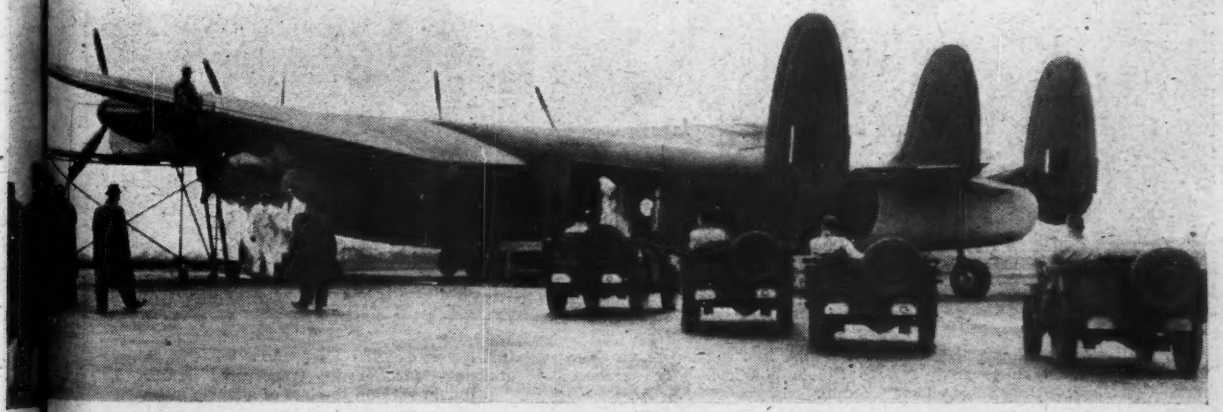
The Prodigal Doodle

Incidentally, the jet-reaction engine of the V1 flying bomb is lighter for its power than any piston engine. It weighs about 350 lb. for 575 thrust horse-power. However, it consumes petrol at the rate of 360 gallons per hour, which means that its thermal efficiency is only 3 per cent.

The average distances to be covered by freight aircraft will not be great. For every journey from Kamchatka to London there will be some thousands of flights from, say, Dover to Calais or from London to Brussels or to Amsterdam. In New Guinea, where hundreds of thousands of tons of freight have been flown from the coast up to the goldfields, the average distance to be covered is only about 50 miles. If goods are very urgent, then they must be sent by mail plane or passenger plane just



COSTLY BALES (right): **A Mackenzie Air Service Fokker with a 1,840 lb. load of furs flown out of the North West Territory of Canada. This cargo was worth 125,000 dollars. (Below): Four jeeps line up to drive on board a freight version of the Avro York.**



CARGO AIRCRAFT

as we send urgent parcels nowadays by mail boat or passenger train. Mail is specialised freight. It is mostly urgent and must be carried at high speeds, particularly over long distances. For carrying mail and parcels post in the British Isles, or between London and the near Continental capital cities, a slow freight mail plane operating at night would probably be fast enough. Speeds are relative. A helicopter flying mail direct from the G.P.O. London to the G.P.O. Paris, at 75 m.p.h. ground speed, would beat a Mosquito doing 375 m.p.h. between Croydon and Le Bourget.

Never before in the history of the world was there such a desperate need for freight aircraft. Millions of tons of shipping are at the bottom of the sea. Harbour installations have been destroyed. Rolling stock has been blown up or worn out, the tracks damaged or destroyed. Bridges are down, roads in bad order, some canals unworkable, barges sunk; half the world nearing starvation, millions homeless, an acute shortage of essential commodities in all countries. What a chance for the freight aircraft—for thousands of freight aircraft!

It was for this reason that we welcomed the No. 170 Bristol Freighter more than any other aircraft since we were shown the first drawings and models of the D.H. Mosquito. As we—W. S. Shackleton, Ltd. (advert.!), deal mainly in used aircraft, we decided to order two second-hand ones at once!

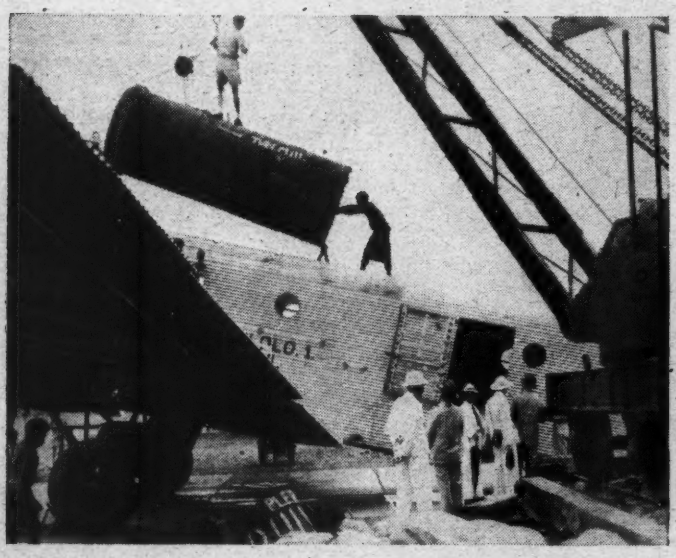
Freighter Conversions

It is a remarkable fact that very few specially designed freight aircraft have been produced anywhere in the world. Freight has mostly been carried in converted passenger machines, D.C.3s, Fords, Fokkers, De Havillands, Junkers and Canadian Fairchilds and Noorduyns. During this war the work has been done mainly by Dakotas, Lockheeds, Liberators, Commandos and Skymasters. We have tried hard to get details of Russian freighters and their work but without success. Russia is the most suited of all countries in the world for the carrying of freight by air.

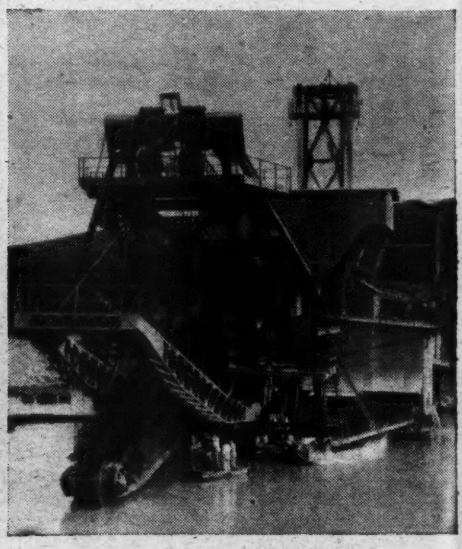
The Bristol Freighter, type 170, will be the first British type to be put into service. Perhaps the earliest of all projected freighters was the Gloster plane by that famous designer, Mr. H. P. Folland. Drawings and mock-ups were put in hand in 1922; and, although it was sponsored by General Sir Sefton Brancker, the scheme was dropped by the Air Ministry in the interest of economy. What economy! It was a biplane powered with a single Napier Lion engine of 450 h.p., weighing all-up 7,000 lb. and with a useful load of 1,900 lb. Its most remarkable feature was the fuselage which was hinged at the rear of the cargo hold, thus giving an unobstructed entry for loading purposes. Our sketch on p. 144 illustrates the scheme.

Probably the most successful freighter ever produced was the tri-motored Junkers G 31, four of which were built to

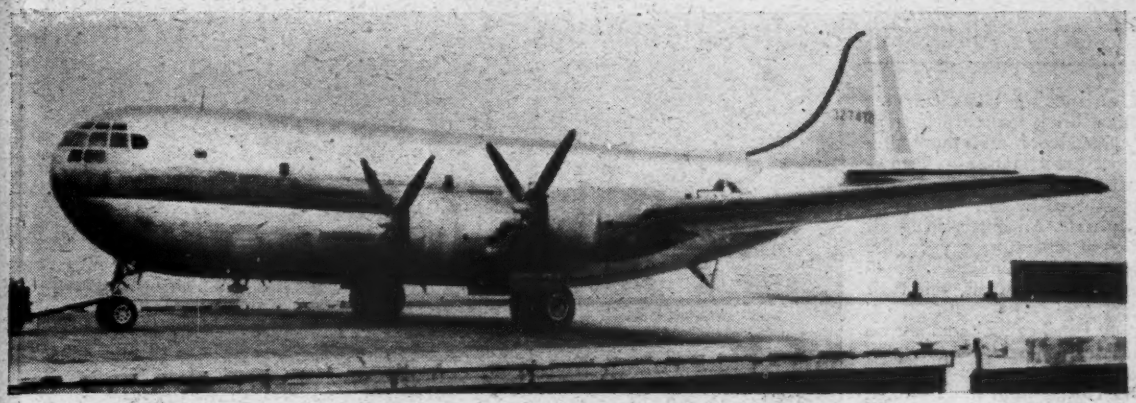
LITTLE HOLES: Loading a Lockheed 14 of Canadian Pacific Air Lines at Edmonton for despatch to places on the Alaska highway. Even in 1942 C.P.A.L. carried a total of 10,000,000 lb. of cargo.



BIG HOLES: Loading a section of a tube mill into the top hatch of a Junkers 31 for carriage from Lae to Bulolo goldfield. The section weighed 5,890 lb.



GOLD DIGGER: The whole of this huge dredging machine was transported by air to Bulolo without the loss of a single nut.



BIGGEST AND FASTEST : The C-97, a cargo version of the Boeing Superfortress. It is 12ft. longer than the bomber ; has 10,000 cu. ft. of usable cargo space and a top speed of over 300 m.p.h. is claimed.

CARGO AIRCRAFT

the order of Guinea Airways, Ltd., around 1929. They were in service in New Guinea until the Japanese invasion. Access to the cargo hold is through a very big hatch in the roof as well as through side doors. It makes a fine cargo aircraft. The G 31 is a typical Junkers low-wing monoplane, all-metal and rugged, powered with three B.M.W. Hornets of 575 h.p. each. Its all-up weight is 18,750 lb. ; disposable load, 8,150 lb. ; and maximum payload over the very short Lae-Bulolo Service, 7,300 lb. The cargo compartment measures 25ft. long, 6ft. 5in. wide and 5ft. 9in. high. The detachable hatch on top is 11ft. 10in. in length×5ft. wide. This hatch is provided with a domed cover to give an additional 12in. of headroom below the hatchway and directly over the centre of gravity of the loaded machine, where, of course, the largest pieces are carried. Its cruising speed is about 105 m.p.h.

In comparing the above figures with the Bristol 170 it should be remembered that we now have a totally different conception of what is meant by cruising horse-power. The 170 is designed *to cruise on only 42 per cent. of its maximum horse-power*, whereas the G.31 uses about 80 per cent.

Another freighter was the 750 h.p. single Cyclone-engined XC-31 Fairchild produced around 1934 for the U.S.A. Army. It did not go into production. All-up it weighed 14,800 lb.—disposable load, 6,373 lb. Just recently the C-82 Fairchild Packet has been announced and details partially released to the Press. It is a high-wing, twin-engined, all-metal monoplane with retractable tricycle undercarriage and tail booms to permit of access to the cargo hold from the rear. The Curtiss Caravan freighter has apparently been abandoned. It was designed during the war for wooden construction with the intention of using non-strategic materials and plant capacity. During the development period the supply position as regards light alloys in relation to spruce and plywood became reversed. Perhaps our wooden gliders and Mosquitoes had something to do with that!

Finally, the American Budd Company have recently produced a prototype freighter in stainless steel, using their own system of shot welding.

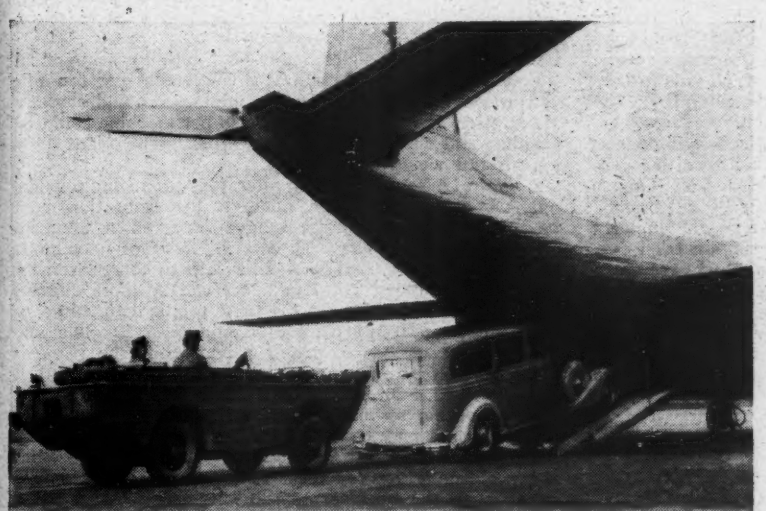
Billingsgate Beaten

Horace says . . .

In contemplating freight carrying we like to recall that fresh fish delivery in the early 16th century over those 200 miles from the warm waters of the Caribbean to the palace of the Aztec Emperor Montezuma on the 7,000ft. uplands near Mexico City. It was a relay race against the clock and Isaac Newton. Hundreds of sprinters were stationed at intervals all along that mountainous track and each tried his best to beat even time. Their motto was "The Fish Must Get Through." As a result fish caught in the evening in the Mexican Gulf was on the Emperor's gold breakfast plate the next morning.

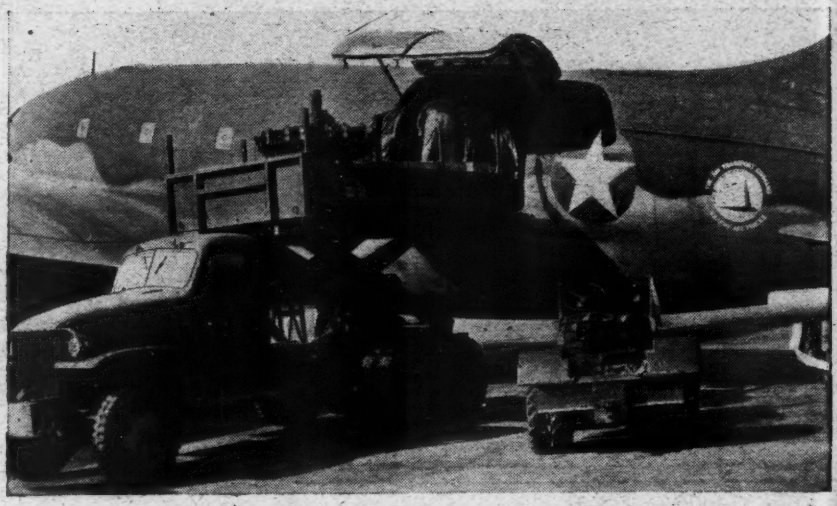
Of course, being an Emperor he might have been one for a late breakfast! He was certainly one for a bit of fried fish! Relays of horsemen could have made better time and they could have carried a bigger payload, but the only living horses in Mexico at that time were those brought by Cortés the Conquistador. What Montezuma really wanted was a freight aircraft, and had he known it there was ample petrol and oil down at Vera Cruz! That same primitive form of freight transport is still in use in many parts of the world.

Loads are still carried by human pack animals. There are pack horses, mules and donkeys in many countries ; reindeer in Finmark ; camels in Africa ; dog-teams in North America ; yaks in Thibet ; bullocks and buffaloes in the Far East ; llamas in Peru ; elephants in Siam. Some of those camel teams travel hundreds, indeed



VENTRAL ENTRY : A " duck " and an ambulance drive up the loading ramp of the Budd shot-welded Conestoga freighter.

CARGO AIRCRAFT



TIME SAVER : A lift truck speeds up the loading of a U.S. Air Transport Command C.46 Commando. The American Army Air Forces are now operating a network of airlines exceeding 140,000 miles.

thousands, of miles carrying silks, brick tea, carpets, porcelain, ivory and more precious merchandise — Tennyson's "costly bales." It should go by air. It *will* go by air! An enterprising air freight operator, say in the Sahara or Sinkiang, could run those camels off their feet.

A camel cannot compete on a basis of pence per ton-mile, much less on ton-miles per hour, although, mind you, it can do more miles on a gallon than we would care to do! Some of the great freight convoys crossing Asia take merchandise worth hundreds of thousands of pounds. A small army is needed to protect them against thieves and bandits. Think, Capt. Lamplugh, of the insurance risks on all this money. The answer is: "Carry it by air."

You will have gathered from this that we do not like camels and you will be right. A camel can kick, spit or bite through 360 degrees. One camel we employed in Australia ate the Mackay Expedition's tape-measure up to 17ft. 1½in. However, it was recovered intact! In those days we used camels, driven by Afghan drivers, to make dumps of petrol and supplies for our aircraft in the desert. It cost us as much as 15s. per gallon to get the petrol there. In future a freight tanker will fly it to the spot. We could then sell those camels to the Hamburg Zoo for dear little German children to ride!

Freight Formulæ

It has been said that the yardstick of transportation can be expressed thus:—

(a) $\frac{\text{Load} \times \text{Distance}}{\text{Time}}$

In other words, How Much—How Far—How Quickly. The formula looks straightforward and innocuous enough, but it is far from being so.

It certainly expresses the *essentials* of transport, but it does so without regard to cost. As applied to aircraft it takes no account of the cruising horse-power, and it follows that it takes no account of fuel consumption either. There is a danger, too, of attempting to simplify it still further by substituting for "Time" one hour and for "Distance" the mileage covered in one hour. The expression then becomes simply Load × Cruising Speed—which fails to take into consideration the hours spent by the aircraft on the ground, earning nothing and costing much.

Therefore in arriving at a formula which will express the *real* cost of transportation under actual operating conditions we must first of all insert a high value for "Time." Let us make it one year so that "Distance" will become the mileage covered by the aircraft in one year. Similarly "Load" *must be the mean payload per mile* carried during those twelve months. It must not be merely the mean payload per flight because this might give a quite inaccurate picture. As, for instance, if we operated with full loads over short distances and with no loads over long distances. We trust you get what we mean!

Now two other yardsticks of transportation have also been suggested:—

(b) Ton-miles per gallon.
(c) Ton-miles per hour.

To these we would add a fourth:—

(d) Ton-miles per shilling.

Let us consider these.

(b) Is useful in assessing the technical merits of rival aircraft.
(c) Is really the same as our old yardstick (a) and suffers from the same defects.
(d) Is the best of the lot but to be used effectively it must be taken over an agreed annual number of operating hours.

In the U.S.A., 3,000 flying hours per annum appears to have been accepted as a yardstick for comparing the operating costs of passenger aircraft, i.e., in arriving at the cost per passenger mile.

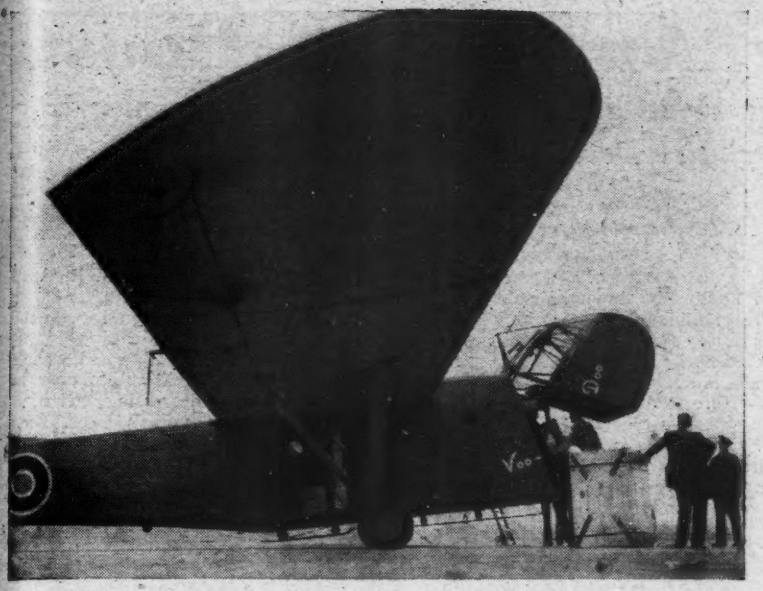
So long as we make a definite standard for comparison and stick to it, 3,000 hours per annum is as good as any other. In the past, however, we must confess that we have been greatly shaken, not by the number of hours a machine can be kept in the air but by the number of hours the average aircraft spends on the ground. We have bought very many passenger machines which have been in continuous operation on civil airlines in Europe, sometimes for as long a period as ten years, and yet their total hours in the air have averaged under 350 hours annually. That means they have been grounded for more than 23 hours per day of their operating lives!

Freight Operation

Let us outline a few thoughts on the operation of freight aircraft.

Size of Fleet.—A big company—other things being equal—should be able to operate at a lower cost per ton-mile than a company owning fewer machines. It could buy at a lower price, the stock of spare parts per machine could be smaller, and the proportion of overheads and plant costs per aircraft would be less.

Utilisation.—A commercial aircraft is producing revenue only when it is in the air. The greatest utilisation must be achieved. The Americans have exceeded in some instances 4,500 flying hours per year. A figure of 3,000 hours is now accepted in the U.S.A. as a basis of comparison for passenger machines. Such a figure will be more difficult to achieve on a freighter. Thirty people can enter or leave an aircraft in a couple of minutes. Loading and unloading some tons of mixed freight while the plane is being refuelled and serviced presents a problem, but it can be solved. On a short-haul service it will not be possible to obtain so many aircraft hours per annum. On certain runs it may be difficult to achieve even 1,000 hours per annum. This will force up the cost per ton-mile, but the problem is not for the aircraft manufacturer only—it is up to the operator to solve it.



TOWED OVER : Voodoo, the C.G.4A glider which was the first ever to be towed across the Atlantic from Canada to Britain. For the crew of the glider it was an unenviable experience.

Loading Factor.—Hundred per cent. loading obviously is the ideal. That is, unless the inspectors are on holiday, in which case 110 per cent. is even better! An average of 65 per cent. on outward and return flights should be regarded as the very minimum to be aimed at. An operator must employ good freight agents to help him to fill the cargo hold. Remember that a plane flying outwards with a full load and returning empty is averaging only 50 per cent. load factor. The aim is to fill it to capacity both ways.

Gliders.—We have no great belief in the possibilities of gliders as civil transports either for passengers or cargo in the post-war world. That some will be used is inevitable because large numbers will be available, perhaps at low prices, together with suitable tug aircraft. To our way of thinking, the big glider is essentially a military development. Its military value has been effectively proved in this war. Let us go over the basic reasons which led us to develop the big gliders.

1.—Draughtsmen hours per lb. of payload for a wooden glider are only about one-quarter as much as for a metal aircraft of corresponding capacity. Therefore, the prototype gliders were produced very quickly to meet the design requirements.

2.—By building simply and cheaply in wood a great and hitherto almost untapped manufacturing capacity became available. Furniture manufacturers, shop fitters, coach body and wagon builders, joiners and woodworkers of all kinds could be brought in to swell the aircraft-manufacturing potential. These firms will wish to revert to their peacetime manufacture as soon as possible.

3.—Ample tugs, varying from single-seater fighters to four-engined bombers, were available. These tugs in themselves were quite incapable of carrying the loads. Their job was to provide the power. Some single-seater fighters could, for instance, tow easily a Horsa glider carrying 30 troops. That is what makes the glider so attractive in time of war.

4.—Due to its low wing loading and by landing on skids, the big glider can be put down safely on rough ground and in very restricted areas.

5.—The military glider is an expendable weapon of war. A large proportion is crashed or damaged beyond hope of recovery. Many fall into enemy hands. Accepting these facts as inevitable, it was obviously logical to make them as simply and as cheaply as possible. No expensive power plants, airscrews nor tanks would be involved in these risks, and only a minimum of controls, instruments, electrics and hydraulics.

None of the above arguments applies to an aircraft for post-war civil transport. Also, it can be proved that a *specially designed aircraft will always beat any combination of glider and tug.* Apart from that, the duplication of pilots, the weight and drag of the tow rope, difficulties in operating in bad visibility or under icing conditions, are arguments against the glider. Every landing it makes is, in effect, a forced landing. Insurance charges would be heavy. The glider requires longer runways, and it is an expensive and awkward thing to move about an airfield. So much for the glider. It has done a magnificent job in this war, but we are not optimists of its chances in peacetime.

At this point Horace, our Tame Stressman, who had been looking over our shoulder, said that he wouldn't be surprised if some enterprising lad, post-war, slapped a few engines in some of our big gliders. That, however, is another story.

Undoubtedly Aviation is the Coming Thing!

(To be continued next week)

RADIO INDUSTRY'S ACHIEVEMENTS

SOME of the high-lights in the achievements of the British radio industry were reviewed by Mr. F. B. Duncan, chairman of the Radio Industry Council, at their recent inaugural luncheon.

Saying that wireless transmission and reception originated in these islands, Mr. Duncan added that it was often forgotten that British broadcasting was started in 1922 by half a dozen commercial firms, "not to make profits, but to found a new industry and develop a new art whose ultimate effect on human existence could only then be seen by a handful of visionaries."

In 1937 the British radio industry produced the installation which broadcast television as a public service in England before any other country in the world. Early in the war it produced radiolocation in time for the Battle of Britain, and enabled men on the ground to detect and plot the course of enemy aircraft miles away, putting us one scientific jump ahead of the enemy.

But it was D-Day which saw the most pregnant development of all, when new and special types of radiolocation enabled our airborne and parachute troops to be accurately concentrated by radio on minute landing areas in darkness. To-day, pin-point aerial bombardment is assured by the recently disclosed "black box" which gives the bomber pilot a picture of the earthly scene below him through darkness, cloud, or fog.

Mr. Duncan also referred to "an item to which we cannot now give a name," but which he thought would probably prove to be the best single contribution from British engineers. It was a vacuum device—something infinitely more than a valve—of great delicacy and complexity, and the heart of the most advanced type of radiolocation gear permitting effective operation on very high frequencies. After the war it would be "directly applied to automatic and infallible anti-collision devices which will ensure the safety of ships and aircraft all over the world's traffic routes."

Saying that improved post-war radio sets would enable people to listen to broadcasts from any part of the world, Mr. Duncan observed: "This freedom of listening, if encouraged everywhere, is one of the strongest hopes for a better understanding between peoples of the world."

Post-war Australian Boost

Country Airfields for Fruit Exports : All-important Question of Cost : Facilities Developed by War Needs

By LLOYD CLARKE

(Former Air Correspondent of the "Sydney Daily Telegraph")

FAST air-freighters can economically carry fresh, perishable fruits from Australia to London in three days, according to New South Wales Labour Parliamentarian A. G. Enticknap.

Mr. Enticknap, whose electorate includes the prolific fruit-growing plains of the New South Wales Murrumbidgee irrigation area, has asked the State Legislature to develop country airfields capable of carrying the world's biggest and most modern commercial aircraft. Citing his own district as an example, Mr. Enticknap foresees local buying markets where peaches, fresh-picked from nearby trees, can be sold, packed and loaded direct on to aircraft for immediate despatch overseas.

His three-day schedule does not differ greatly from that of the chairman of British Overseas Airways Corporation (Viscount Knollys). During a recent visit to Australia Viscount Knollys considered a two-and-a-half day London-Sydney schedule a decided post-war practicability. Lord Knollys' schedule, however, was based on express air mail and passenger services on which fares and government subsidies would undoubtedly make payloads an economic proposition.

Australian airline authorities do not share Mr. Enticknap's rosy outlook—not at the moment, anyway. They believe that a freighter service along lines he suggests would sky-rocket Australian fruit prices to heights which appear fantastic to the Australian housewife. On pre-war charges, a 10-ton cargo could be landed in England for about 15/- (Australian) a pound. An average quality local peach (about five to the pound) would cost the English wholesaler about 3s. 2d. (Australian). On this costing, however, it would take considerably more than three days to get the cargo there. Greatest economy in payload could only be effected by decreasing fuel load to a minimum, with consequent short hops. Based, even on the schedule of the pre-war Empire service, a 10-ton freight load of peaches would take 10 days to reach England.

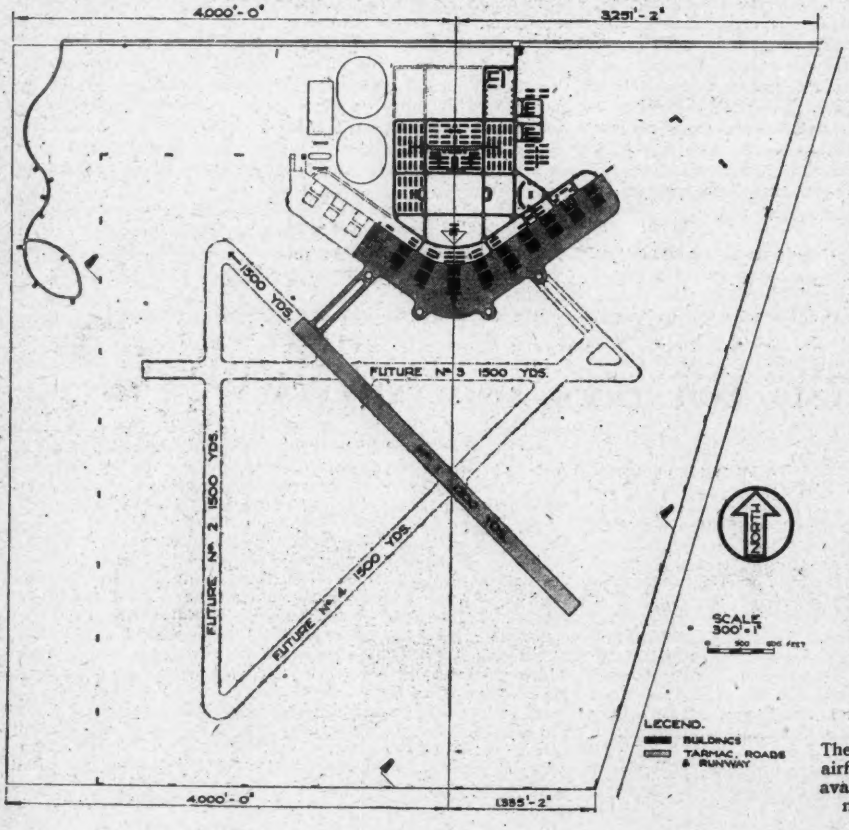
But Mr. Enticknap's appeal was not in vain, for he opened in the New South Wales Parliament the important question of post-war intra-state aerial services. His plea resulted in a State Government decision to press for the immediate construction of airfields at a number of inland centres. Australia is a vast country. The present intra-state service between Sydney and Broken Hill (702 air miles) is greater than the airline distance from London to Berlin (600 miles).

Strategic Airfields

The foundation for an extensive internal post-war airline network has already been laid as a matter of war necessity. Placed at strategic points from one end of the continent to the other are airfields capable of handling the largest and heaviest aircraft in service to-day. Most of these, at present, are Royal Australian Air Force stations, but their peacetime operation will be no less valuable. Most are placed at points particularly advantageous to Australian sections of probable overseas routes.

Details of Air Force airfield construction are still largely secret, but two developments of this type, bound to influence post-war internal aviation, are the air depot at Tocumwal and the great inland flying-boat base at Lake Boga. Both are on the Murray River separating New South Wales from Victoria.

Threatened with Japanese invasion of the east coast of Australia and the possibility of having to abandon large areas to the north, the Australian Government prepared strong bases in the south for the protection of vital southern industrial centres. Tocumwal air depot was begun as an emergency works measure in February, 1942. The first aircraft landed there two months



The general pattern of the wartime airfields laid out in Australia and available for post-war traffic. Little modification would be needed.

POST-WAR AUSTRALIAN BOOST

later despite U.S. Army engineers' predictions that it would take ten months to complete the station to a stage where it could be used. Tocumwal has more than 366,900 sq. yd. of runways, 254,000 sq. yd. of taxiways, gravelled areas covering 1,098,000 sq. yd., and tarred surfaces of more than 1,375,000 sq. yd.

The flying-boat base at Lake Boga (eight miles in circumference) was begun in June, 1942, and was completed a few months later. It still remains one of the biggest flying-boat repair and service depots in the South-West Pacific area despite its 200-mile distance from the sea. This location was selected to avoid the risk of shelling and spasmodic raiding from carrier-borne aircraft to which the more accessible coastal bases were subject.

But the dispersal of the Japanese invasion fleet in the Coral Sea battle of May 8, 1942, ended the immediate threat of Japanese landings on the north-east mainland, and need for large air bases, maintenance and repair shops on the same scale as Tocumwal and Lake Boga developed to the north. The steady advance brought other airfields, with latest night-landing equipment, navigation and homing aids. Development was not confined to the east coast. It expanded on an equivalent scale in the west and to the central north.

Townsville (North Queensland) provides one mentionable example. Formerly the site of a small civil airport, it became the jumping-off place for the 720-mile ferry hop across the Coral Sea to Port Moresby. Aircraft, mostly Douglas C-47s, made the crossing in 4½ hr. average time, but bad weather fronts in the steamy tropical climate made the use of radio navigational aids vital. It was common to leave Townsville and fly over or through heavy rain and turbulent cumulus without sighting coral reef or sea until the "ship" nosed down off the Papuan coast.

Speeding Up

As the tempo of the Allied air offensive quickened, Townsville airfield, expanded and modernised to cope with B-17s and B-24s bombed-up to capacity, became an operational and air-dispersal point for transport aircraft, bombers and fighters. Removed from fear of enemy attack, it became a gigantic rear echelon base for repair and maintenance. To cope with air traffic, the Australian Government built another vast field within a few miles of the expanded Townsville base. Here the U.S.A.A.F. established one of the biggest aircraft hospitals in the world.

Most of these air stations, and those to the north and west, have followed a general pattern. Scores like those in the general plan (on page 150)—will be available for almost immediate post-war use. They offer bright peacetime prospects to centres whose lack of development has been largely due to communications difficulties. The Commonwealth Department of Civil Aviation has also played an important role in the wartime programme. Full resources of Australia's civil airline fleet have been pooled for wartime operation. Present services function on skeleton schedules so that the fullest possible use may be made of civil aircraft for military charter duties.

During movement of troops to New Guinea for the assault on Buna (British New Guinea) in December, 1942, all Australian civil airline services were cancelled. Every serviceable machine was pressed into the aerial trek to New Guinea bases. The convoy which made this hazardous crossing included everything from aged DH Dragons to D.C.-3s.

Miles and Loads

Some idea of the wartime burden carried by Australian civil airlines during five years of war can be had from a comparison of official statistics for the years ending June, 1939, and June, 1944. Total miles flown in 1939 were 9,664,628, little less than the 1944 tally of 9,703,898, but passengers carried jumped from 99,511 to 214,667. Comparative mail loadings for the same period were 164,187 lb. and 4,402,504 lb. Freight figures for 1944 were 90 per cent. greater than those of 1939.

This task was completed with greatly reduced air fleets, and the figures apply only to strictly civilian services. A close priority system was inaugurated early in the war, and most of the civilian passengers were on urgent defence or national business. In addition, civil aircraft under charter to the U.S. Army flew 4,984,222 miles, lifted 70,747 service personnel and 3,208 tons of service freight.

In 1939 the Civil Aviation Department controlled 68 airfields. To-day it is operating 74. Airfield acreages under its jurisdiction have increased from 10,800 acres in 1939 to 19,700 in 1944, and Service stations and their airfields are not included. Paved runways have increased from 1,018,000 sq. yd. to 4,956,000 sq. yd., and values of its assets from £986,000 in 1939 to £3,054,499 in 1944.

The Department of Civil Aviation is now operating an extensive aeradio network. It has built 14 communications stations in the past five years. Another is at present under construction. Twelve direction-finding stations recently completed bring the total now in use to 35. Australia began the war with 10 radio range stations, has 15 at the moment, and 28 under construction. There were no homing beacons under Civil Aviation control in 1939. To-day there are 22, and two more are nearing completion. It now operates 28 fully lit airfields at key centres throughout the Commonwealth.

Mr. Enticknap's plan may be an optimistic one, but whatever obstacles bar its progress, lack of good modern airport facilities will not be one of them.

AIR AMBULANCES RESCUE WOUNDED IN BURMA

R.A.F. light aircraft operating on forward strips and runways hacked out of jungle have saved the lives of many West African troops fighting in the remote reaches of the River Kaladan, in Arakan. Hundreds of wounded were carried in a matter of minutes from the jungle battlefields to the comfort of British and Indian hospitals, journeys which, had they been possible by land, would have taken many days.

The hazards of this work were recognised recently when the D.F.M. was given to Flt. Sgt. (now Pilot Officer) J. K. Davies, of Pontefract, and the D.F.C. to W/O. M. L. Cecil, of Subiaco, W. Australia, former members of the squadron. The latter never lived to receive his award, as he was killed in a flying accident during the monsoon.

The story behind the work of these pilots began early last year, when the West Africans made their advance along the Kaladan and evacuation of the wounded became a problem. The answer lay in employing Tiger and Fox Moths, modified to take stretcher cases. As the West Africans advanced, they built small landing strips in paddy fields or on dry river beds. These strips were never more than a few hundred yards from Japanese positions, and were almost continually under mortar or machine-gun fire. During engagements with the enemy a call would be sent back, and the ambulance pilots at once set out to pick up casualties. Their journey, a little over 50 miles there and back, was mostly over enemy territory and entailed a double crossing of a 3,000ft. high range of hills. P/O. Davies and W/O. Cecil flew an average of 10 hours a day to evacuate wounded. Davies made over 100 sorties.

At one position where casualties were being evacuated the enemy made an attack and the West Africans withdrew to another point. Wounded still remained to be evacuated, and the pilots flew in to pick them up until they were forced to stop. Even on that occasion W/O. Cecil insisted on his "last run," and, taking in a pilot to fly out a damaged Moth, he collected the last casualties from the deserted strip under mortar fire a few minutes before the Japs arrived.

Between February 16th and May 8th last year over 2,000 casualties were brought out to forward bases, where they were put into hospital or transferred to Dakotas and flown to the rear.

Simpler Flying

Part II of Mr. Weick's Account of Four Years' Experience With the Ercoupe

(*Concluded from page* 125.)

Taking-off.—The technique for taking-off has apparently been acquired quickly and without special effort. The start of the take-off run usually is made with the wheel in the neutral or medium position. To take off the ground it is necessary to increase the angle of attack of the wing by lowering the tail, and this is usually done by moving the control wheel back gently after the minimum take-off speed has been exceeded by a comfortable margin.

It is possible to have the aircraft take-off by itself, with no force applied to the control wheel, by setting the longitudinal trim adjustment to a nose-up (or low-speed trim) condition.

The shortest take-off run is ordinarily obtained by holding the control wheel full back throughout the entire ground run. The tail will not come down until flying speed has been attained. The wheel should be eased forward as soon as the aircraft leaves the ground, however, or the nose will point up too steeply for good climb and it may drop back again momentarily with some loss of altitude.

In taking off cross-wind or in gusty air, it is advisable to keep the control wheel well forward, which holds the nose wheel firmly on the ground, until the desired take-off speed has been reached, and then to take off decisively and without hesitation. The aircraft may weathercock into the wind just as it leaves the ground, but this need cause no concern. It is merely adjusting itself to true flight with respect to the air, and a straight course of travel is maintained without difficulty with the aircraft then in the crabbed position made necessary by the cross wind.

Turns on Take-off

In a few cases Ercoupes have been known to turn or change heading slightly when they leave the ground, even though there is no cross-wind. This is an indication that the linkage connecting the ailerons, rudders, and nose-wheel is out of adjustment. All these are moved simultaneously by the control wheel and they must all be at their respective neutral positions at the same time. The nose-wheel will control the direction of the take-off run, and if the ailerons or rudders are deflected from neutral when the aircraft is running straight along the ground, they will naturally tend to bank or yaw the aircraft when it leaves the ground. It is therefore necessary that proper adjustment of the linkage be maintained, a simple matter when the requirements are known.

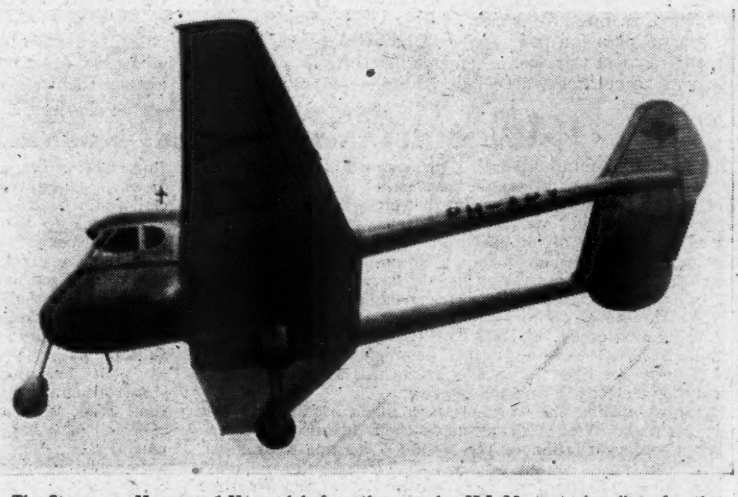
Some difficulties have been experienced in connection with take-off runs in muddy fields. In the original design all three wheels were supported in closely-fitting forks designed to have low drag and to scrape off the mud in the manner of a lathe tool. Although these appeared to work fairly well in the early tests, when the aircraft went into general service some forms of mud were encountered which acted effectively as brakes and stopped the rotation of the wheels entirely. A modified form of rear landing gear in which the forks have been eliminated was incorporated in the last few aircraft produced, and these appear to eliminate the mud clearance difficulties for the rear wheels. We also have a new single-prong fork with large tyre clearance designed for the nose-wheel, but we have not yet had an opportunity to try it out.

Accidents during take-off have been of two types, those due to bad terrain and those involving collision with an object after the aircraft has left the ground. There have been four of each kind reported to the C.A.A., or an average of one each annually per 100 aircraft operated. In two of the four due to bad terrain, the pilots started take-offs from strange unprepared fields without troubling to check the surface condition, and in both cases they ran into ditches. All four cases involved some landing gear damage, two to the main gear and two to the nose gear, but none involved injury to the occupant. In three of the four cases of collision after take-off, the aircraft hit a fence, resulting in some damage to the aircraft but no injury to the occupants.

Sighting Lines

Straight Flight.—Without the possibility of crossing the aileron and rudder controls, flying a straight course properly has given no particular difficulty, once the new pilot has started steering for definite points. In a side-by-side aircraft with its off-centre seating it is often difficult to determine the exact direction in which the aircraft is heading. As a minor aid to the pilot in this matter, particularly when flying a range of points, a longitudinal sighting line is now being provided directly in front of each occupant on the top of the motor cowling or hood. (This line will also help him to keep track of the true attitude of the nose in turns.)

There have been some pilots, experienced on conventional aircraft, who have expressed a dislike for a slight yawing or "S-ing" action that an Ercoupe may have while flying a course in gusty air. Of course, all aircraft follow somewhat irregular paths in gusty air, but in the case of the Ercoupe two conditions appear to aggravate it. First, when an Ercoupe has had considerable flying time the piano-type hinges of the rudders wear somewhat, especially if they have not been oiled and kept clean, and the rudders may be free to float within a deflection of a couple of degrees. Then small aileron deflections which may be used in an attempt to keep the wings level in gusty air or in making slight course corrections will cause adverse



The Stearman-Hammond Y, used before the war by K.L.M. to train pilots for the tricycle Douglas D.C.5.

yawing moments, but because the fixed fins are small compared to the partially floating rudders, the aircraft will have little if any tail yawing moment to neutralise the adverse yawing moment of the ailerons, and the nose will hesitate an instant before swinging in the direction desired. With tight rudder hinges and linkage this hesitation should not exist.

The second condition is that it seems that many experienced cross-country pilots use the practice of making slight course adjustments by rudder alone, allowing the bank to take care of itself as induced by slight skidding. Recently flight instruction has tended towards using the ailerons and rudders together to make perfect turns when performing course corrections, and the action in this practice is the same as that which occurs in well co-ordinated two-control flight.

The 150 h.p. Cirrus-engined General Aircraft Owlet which was a training development of the Cygnet cabin monoplane.

Almost all the pilots with considerable cross-country time in Ercoupes appear to be satisfied with the handling characteristics while cruising in gusty air. They work the controls less under these conditions than do the pilots with little Ercoupe experience, for with very little correction of attitude by the controls the aircraft will maintain a fair average course while undulating in gusty air.

Turns.—Due to the instructive writings of students of flight and piloting, it is now becoming generally known by pilots that a turn is not made primarily with the rudder, but that the main requirement is that the wing be banked so as to incline its lift to make the aircraft change its course direction, and that with conventional controls the aileron is used to maintain the desired bank, the elevator to maintain the proper speed, and the rudder merely to keep the aircraft flying a true course without slipping or skidding.

With the rudder pedals eliminated and the entire control made by means of the control wheel, the co-ordination is automatically taken care of by the characteristics of the aircraft and there is no opportunity for the pilot to co-ordinate the aileron and rudder controls incorrectly. The making of turns is, therefore, exceedingly simple, and satisfactory turns can be made with very little practice.

High-wind Turns

The elimination of the rudder pedals is a particular help in making proper turns in high winds close to the ground, where even the most skilful pilots find it almost impossible to co-ordinate their controls so as to make proper turns.

The most significant thing about turns and Ercoupes, however, is that, as was mentioned previously, no one appears to have lost control in a turn, or come to grief from a turn.

Other Air Manœuvres.—The manœuvrability of an aircraft depends mainly on its ability to turn quickly and sharply. Getting into a sharp turn quickly requires powerful aileron control to attain the necessary bank, and quick response to the elevator to increase the angle of attack. The ailerons of the Ercoupe are unusually powerful, for they are large and are also deflected further than usual. In addition, the elevator control, although limited in its upward travel, is sensitive and the aircraft responds to it instantly. Thus the controllability and manœuvrability of the aircraft are exceptional.

This condition does not appear to be generally understood, probably because the term "limited elevator control" (initiated by the writer thirteen years ago to his present embarrassment) carries the unfortunate implication that the control responsiveness is sluggish and the manœuvrability very meagre. Just the opposite is true, for in the opinion of the writer, safe operation requires ample control and manœuvrability to overcome the effects of gusts and occasional misjudgments.

There also appears to be a general misconception, probably because the aircraft does not spin, does not sideslip with two-control operation, and has the upward travel of its elevator limited, that it cannot perform acrobatic manœuvres. It is true that acrobatic manœuvres depending on stalled flight, such as the spin and the snap roll, cannot be performed, nor can good straight slow rolls be performed without rudder pedals. The manœuvrability is such, however, that even without the rudder pedals, presentable aileron rolls can be performed, as well as loops, Immelmann turns, Chandelles, etc.

Glide Control

Landing.—There seems to be no question in the minds of pilots that the tricycle gear simplifies the landing operation largely because the aircraft stays on the ground by itself even though it is landed at well above minimum speed. There has been considerable difference of opinion however regarding the Ercoupe's landing approach glide, for with two-control operation and no rudder pedals the conventional sideslip is not available for losing altitude rapidly to avoid overshooting.

The problem of glide control for an aircraft without rudder pedals was explored fairly thoroughly in the W-1 and W-1A aircraft experiments which preceded the Ercoupe. That work resulted in the opinion that a glide-control flap was a definite help in making a landing on a given spot, but that if the aircraft had a steep enough gliding angle and a tricycle gear, landing on a given spot was sufficiently easy even without a special glide control. When we started the Ercoupe the use of flaps was considered, but extreme simplicity of flight from ordinary fields was taken as being more important than the ability to get in and out of very small fields with great ease. The original experimental aircraft was designed with ailerons covering practically the entire wing span with the idea in mind that, if a glide-steepening device was considered essential after some flight experience had been obtained, the inner portions could be cut off and converted into flaps.

After a substantial amount of flying had been accomplished, it was decided that the flaps would not be required because all the pilots agreed that getting the aircraft into ordinary landing fields was no problem at all. Furthermore, any of several means for losing altitude could be used with a bit of practice. The first obvious one is merely to nose the aircraft down and land it at a higher speed, and this works quite satisfactorily if the altitude to be lost is not too great and if the landing field is smooth and not too small. If the excess height in the approach is noticed at an early enough stage, a relatively steep glide can be obtained by reducing the speed to the point at which the drag is high. In that case, it is well to nose down at an altitude of about 200ft. and pick up sufficient speed to flare off the flight path and reduce the vertical

velocity before contact with the ground is made. Altitude can be lost even more quickly in the low-speed glide if the wings are rocked from side to side about 15 deg. and rather quickly, or if S-turns are made. A certain amount of yawing occurs if the wing is rolled back from a bank just before the turn has developed. Finally, one of the best ways of adjusting the approach nicely seems to be to make the time-honoured 90-deg. turn, which can be cut short, or stretched, as required.

Of course, all of these manœuvres require a certain amount of piloting skill, and there has been an indication from some users of the aircraft, mostly instructors, that some means for steepening the glide path while flying straight and at normal approach speed would be desirable. In general, the experience has been that pilots who fly the Ercoupe a fair amount and become familiar with it have no difficulty in getting into small fields and have no particular desire for flaps or other means of glide control. Pilots who are just starting on Ercoupes are likely to want some extra form of glide control, however, particularly if they have previously been relying on sideslipping to help their approaches. Also, there is not much doubt that beginners and pilots who fly only occasionally would be helped in approaching to small fields by an effective glide control, and the thought is growing that the advantage may be sufficient to offset the complication of an added control to operate.

SIMPLER FLYING (CONTINUED)

In this connection we have experimented with spoilers hinged on the upper surfaces of the wings of an Ercoupe but have not produced an arrangement that received unanimous approval by the pilots who have flown it. One disadvantage was that if the air speed was held below about 75 m.p.h. when the spoilers were applied in the landing approach, the glide path steepened but the nose of the aircraft stayed at about its original level, momentarily obstructing the view of the spot on the field at which contact was to be made.

The aircraft can be held off in the conventional manner until it loses its flying speed. This practice is preferred by some pilots in order to reduce the ground run, and is always advisable in case of rough terrain.

Brake-on Landing

After landing, the brakes may be used as desired. In an emergency they may be applied before the landing is made, but this procedure is not recommended as standard practice on account of the tyre wear involved. During the landing run the brakes should be released if slippery terrain or loose gravel is encountered and a tendency to skid is noticeable, as in the case of an automobile.

If the aircraft without rudder pedals is being landed in a strong cross-wind, it must be pointed up-wind sufficiently to keep the flight path in line with the runway, and it will approach the ground with the wings level but with the nose crabbed upwind. This should not alarm the pilot for, with the stable tricycle gear, contact with the ground made in this manner is quite satisfactory, because the stability of the gear will automatically change the heading of the aircraft so that it continues down the runway, provided the nosewheel is left free to caster.

In making cross-wind landings it is well to set the aircraft on the ground very definitely, but not at high speed, and to move the control wheel forward somewhat in order to hold the nose down and reduce the lift on the wing as contact is made. Under strong cross-wind conditions some pilots prefer to glide straight to the ground without pulling the control wheel back to flare off the glide path before contacting the ground. This ensures making a definite contact. It is also helpful in some cases to set the brake on about half-way before making contact, and possibly to apply it strongly just after contact is made. This tends to hold the nose down and the wing at a low angle of attack and also cuts down the speed to that of a reasonable taxi-ing value as quickly as feasible.

Another important point in a cross-wind landing is that the aircraft should be given its head with very light if any lateral pressure on the control wheel at the moment that contact is made. This permits the stable castering tendency of the nose-wheel to act, and the aircraft will change its heading slightly so that it lines up with the direction of its motion along the ground.

One point that deserves clearing up in this matter is that in a properly-made cross-wind landing with the aircraft crabbed at contact (following the ground course desired, but with the nose crabbed into the wind) and the nosewheel free to caster, the rear wheels do not receive a side load of any substantial magnitude, as has been thought by some engineers and pilots. The longitudinal drag of the main wheels, behind the centre of gravity, causes the aircraft to change its ground path. The only factor that resists this turning of the machine about its vertical axis (not in its course of travel) is its own moment of inertia about its vertical axis, and the change in heading is ordinarily accomplished in less than a second and without apparent strain. If the course of the aircraft's travel is changed at the moment of contact, as it is when the nosewheel is held in position, whether neutral or deflected, a large lateral force occurs and difficulty may follow. If, however, the nose-wheel casters properly, the cross-wind landing appears to be an effortless and natural manœuvre.

Landing Accidents

Accidents in landing which have caused damage to the machine can be divided into three groups: those due to poor piloting technique at contact, landings on poor terrain, and collisions with objects in the landing approach. Under the classification of piloting technique there have been an average of five accidents annually which caused damage to the aircraft for each 100 machines operating. None of these cases involved any injuries to the occupants. In nearly three-fourths of these cases the nose gear or its supporting members were damaged, whereas only one-sixth of them involved damage to the main gear. Obviously in these landings the nose gear has been receiving harder treatment than it was designed for, and in order to alleviate the situation the nose gear and its supports are being substantially strengthened.

About one-fourth of the poor technique landings involved overshooting or undershooting and might possibly have been helped by a glide control. The same proportion of bad landings involved levelling off too high, losing flying speed from 20 to 40 feet above the ground, and striking the ground with the nose well down while the aircraft was regaining flying speed.

In the second group of landing accidents, those involving poor terrain, landings were made on surfaces ranging from extraordinarily rough open fields to fields filled with stumps or large rocks. These also involved an average of about five aircraft annually for each 100 operating, and the relative damage to the nose gear and main gear units was about the same as for the poor-technique landings. Some of the rough open field cases might have occurred without any damage if the strengthened nose gear had been in use, but if landings are made into stumps, rocks, and ditches, a substantial amount of damage appears inevitable. In these landings there was only one minor injury, which is probably an indication that the aircraft's structure affords the occupants substantial protection.

One-third of the landings on poor terrain were forced landings, half of which were caused by engine failure. One-fourth of the landings were caused by undershooting or overshooting at a regular flying field, a type which might be reduced by a good glide control.

One aircraft per year out of 100 operating collided with some object during the approach to a landing, although no injuries were incurred. One struck electric light wires that were difficult to see, causing the aircraft to contact

SIMPLER FLYING

the ground nose down, but without damage. The same aircraft with a different pilot at a later date struck a telephone pole in an approach in the dark. One wing and aileron were damaged, but the pilot managed to fly around again, the airport lights were put on, and he landed without further damage. The other two approach cases involved undershooting and hitting a fence.

Ground Handling.—Personal aircraft such as the Ercoupe obviously should be provided with good engine starters if they are to be put into general use. There have been three cases in which damage has occurred when the engines were started without a competent operator in the cockpit, one of which ended with the impromptu solo flight of a feminine passenger mentioned previously. We have experimented with two kinds of mechanical starters deriving their energy from the operator, but neither is entirely satisfactory. The electric starter with battery and engine-driven generator seems the only solution in sight, and the pound-be-devilled light aircraft designer might as well resign himself to the fact, hoping that good lightweight ones will be developed.

Hangar attendants, accustomed to conventional aircraft, sometimes push in the wrong places when moving strange Ercoupes. In order to facilitate moving them around the hangar and starting line, a small "waggon handle" or tongue is being provided to slip into the hollow axle of the new single-prong nosewheel gear. They can be made light enough to carry in the aircraft.

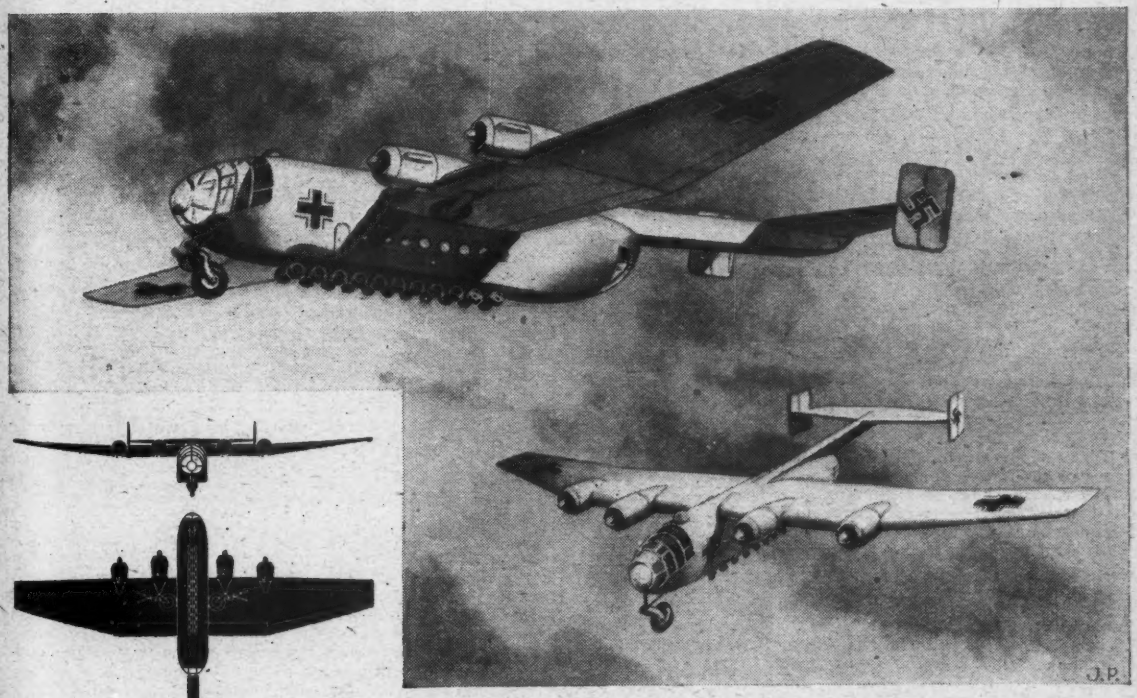
The tricycle gear and level wing have facilitated riding out gales when the Ercoupes are staked out. They are ordinarily tied down only near each wing-tip where screw-in eye bolts are provided. Only one case of damage during a wind storm is known to us, and in this case the nose oleo was low and the aircraft was parked with its nose down a slope towards a ditch. The tail was well up in the air at a good angle, and a sudden wind storm from the direction of the tail lifted it up and shouldered the aircraft over into the ditch.

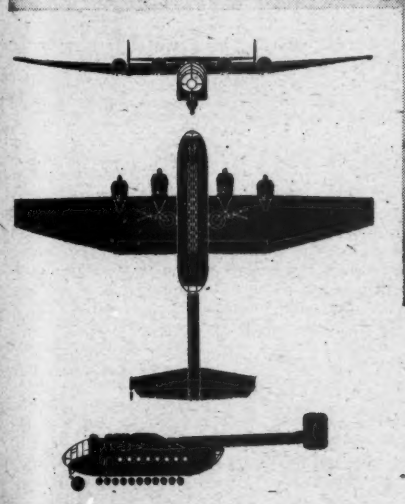
Sunshine Protection

Comfort.—The Ercoupe sliding window arrangement which provides instant choice of open or closed cockpit, appears to be well liked on the whole. In some portions of the country, at least for certain seasons, some protection from the sun is needed, however. For this purpose an overhead sun-shade window fitting in the same tracks as the regular side windows has been provided. The sun-shade is made of a green plastic that gives protection from the direct rays of the sun but is transparent enough so that clouds and other aircraft are easily visible through it. Thus the 100 per cent. view above the horizon is still available.

The windows are also being substantially improved in details, including deeper tracks and latches to hold them in any position desired. Another much-needed addition to comfort is being added in the form of a muffler and sound insulation.

Concluding Remarks.—In surveying the record of the four years of general Ercoupe flying outlined herein, it appears that the basic aims of simpler flying, shorter learning time, and freedom from the dangers of stalled turns and spins, have in the main been attained. All aircraft have minor imperfections that can be helped by engineering improvement, and in the Ercoupe these now pertain largely to items of secondary importance and are being worked on as they come to our attention.





FLYING CENTIPEDE: A comparatively recent example of the German idea of the "box-car" type of air transport, the Arado Ar 232B has a fixed multi-wheel undercarriage in addition to a more or less normal tricycle landing-gear, of which only the main wheels retract. Its "centipedal" feature—for rough ground—improves on the ten wheels fitted to the Me 323 by more than 100 per cent.; it boasts 22 of them! With a span of 105ft. and a length of 77ft., it is powered by four Bramo-Fafnir air-cooled radial engines, each giving 985 h.p. for take-off.

CIVIL AVIATION NEWS

AIRPORT FOR VATICAN

THE Vatican is reported to be studying the possibilities of constructing a small airfield within its boundaries to enable church dignitaries to travel without alighting on Italian territory.

DISRUPTING INFLUENCE

MR. ALEXANDER B. ROYCE, chairman of the Airlines Committee for U.S. Air Policy, in a speech at New York, said that the proposal for a single international U.S. airline would "disrupt the basic principle of regulated competition, which was established by the people through Congress in the Aeronautics Act of 1938."

P.A.A. CUTS FARES

DETAILS of the Pan-American Airways' proposed programme for the Pacific and Alaska, filed with the Government last week, show greatly reduced flying times and fares.

The fares are mostly lower than the first-class shipping fares. For example, a 108-passenger aircraft is scheduled to fly from Los Angeles to Sydney in 32 hours, charging $295 (about £75).

LUFTHANSA'S LAST

THE *Lufthansa* service between Germany and Portugal is reported to have been recently reorganised. The service is now operating in two sectors, once weekly from Stuttgart to Madrid by large aircraft of the Fw 200 class carrying newspapers, and the second sector from Madrid to Lisbon by small and fast machines carrying only two passengers.

HAWAIIAN EFFICIENCY

HAWAIIAN AIRLINES (previously Inter-Island Airways), one of the world's smallest air transport companies, have recently celebrated their fifteenth anniversary with a proud record of a 100 per cent. operational safety throughout that period.

With three Douglas DC-3s and two Sikorski S-43s as freight carriers, the Hawaiians operate a network of 350 miles and do their own maintenance and repairs. Last year they carried 108,000 passengers; fares charged were 8 cents per passenger mile.

SPANISH PURCHASE—

THE sale of three Douglas DC-3 aircraft to the Spanish Air Transport Company, Iberia, has been approved by the U.S. Surplus Commission.

The sale was made under the agreement between the U.S. and Spain, signed on December 2nd, establishing three transoceanic air routes with terminal points at New York and Madrid, Seville and Barcelona.

—AND AIRLINE PLANS

THE purchase of twenty-five Douglas aircraft and an increase in the domestic airline services were among the matters discussed at a meeting of the board of the Spanish Iberia Airline Company last week.

The managing director reported that the Spanish delegation at the recent International Air Conference at Chicago had discussed the purchase of U.S. aircraft, including four trans-Continental and twenty-one Continental Douglas DC-3 and DC-4 machines.

"It is planned," he said, "to increase the frequency of the existing Spanish airline services and to establish new lines to the Canary Islands, Spanish Guinea, the Balearics, and a new line linking up the northern provinces of Spain parallel to the Atlantic coast."

The total capital of the Iberia Airline Company, the chairman announced, is now 100,000,000 pesetas (about £2,500,000 at present rates). It is owned by the National Institute of Industry—a State concern created to control big industries.

AIR SERVICE TO AUSTRALIA

ARRANGEMENTS for the establishment of a direct service between Britain and Australia were announced in Canberra recently.

The aircraft will operate direct between Britain and Australia, Australian crews taking over at Karachi. The Liberator and Catalina aircraft which will be used on the Indian Ocean part of the service will eventually be replaced by Lancasters.

The Indian Ocean service now arrives at and departs from Perth every three days and is operated jointly by the B.O.A.C. and Qantas. The existing arrangement is to continue, but without prejudice to long-term policy.

The cost of the ground organisation in Australia for the new service will be met by the Commonwealth Government, and Britain will be responsible elsewhere.

In making this statement Mr. Francis M. Forde, the Acting Prime Minister, expressed his hope—perhaps rather too optimistically—that sufficient aircraft would be available for a once-weekly service by February 1, building up a daily service thereafter.

But on January 31st Mr. Hudson Fysh, managing director of Qantas, announced a postponement "needed to give Britain priority in building warplanes." The service, he added, would definitely begin early this year.

RAILAIR VIEW

MR. O. H. CORBLE, assistant general manager of the L.N.E.R., speaking of air travel in Britain after the war, said to Hackney Rotarians recently, "A lot of planning has to be done in connection with the resiting of our airports. How long will London be content with Croydon, which is half an hour away by Victoria? Not very long.

"Air travel will not be cheap. People have the idea that post-war air services will be at a speed of about 500 m.p.h.; they are mistaken.

"We aim at an economic safe speed of about 200 m.p.h. and we want frequency of service with a small type of aircraft."

CANADIAN REPORT

A REVIEW of the activities of Trans-Canada Airlines during 1944, given by its president, Mr. H. J. Symington, C.M.G., K.C., shows a substantial increase of domestic and overseas operations.

The Canadian Government transatlantic air service, a scheduled operation undertaken by T.C.A., carried high-priority passengers, freight and mail bound to and from Canada's armed forces overseas. Although operating under great difficulties, the addition of more modified Lancaster-type aircraft, more flight crews and more trained maintenance personnel resulted in increased schedules. Individual mail loads of as much as 3 tons were commonplace.

Domestic routes now total 5,296 miles, including an east-west service from St. John's, Newfoundland, to Victoria, B.C., and north-south branches reaching into New York, London, Windsor, Calgary and Edmonton. During 1944, T.C.A. aircraft flew 9,144,000 revenue miles (last two months estimated), an increase of 889,181 over 1943.

Traffic continued to mount—as it has during each of T.C.A.'s seven years of life—although not to the same extent as in the past, due to near-capacity utilisation of available aircraft. Passengers numbered 157,800, an increase of 17,524. Mail weighed 3,818,700 lb., an increase of 92,093. Express weighed 903,300 lb., an increase of 81,694. (Figures for the last two months are estimated.)

To cope with this rising demand and better to serve the public, T.C.A. opened traffic offices in Sydney, St. John, Moncton and Lethbridge. The first frequency-modulated radio-telephone circuit to be installed in Canada for commercial airline purposes began operation between Vancouver and Victoria in June.

At Winnipeg the company operates its engineering and maintenance base, with research facilities, and the workshops at Montreal took care of conversion and maintenance work necessary for operations over the North Atlantic and also continued to maintain the Liberator aircraft used by British Overseas Airways Corporation on the North Atlantic Return Ferry Service. Schedule increases and modification programmes considerably enlarged the scope of this assignment in 1944.

The total of T.C.A. personnel increased 15 per cent. during the year. Many of the newcomers were repatriated and discharged members of the armed forces, and this trend is expected to become more pronounced.

The T.C.A.—Mr. Symington said—has very concrete ideas for peacetime international operations. At home a direct Winnipeg-Edmonton service will be begun immediately upon the completion of the required airport and navigational facilities along that route; other additional schedules are also contemplated.

The Eighth's Third

Generous Tribute to Royal Air Force on Help and Experience Given to the Americans

Lt. Gen. James H. Doolittle received from Marshal of the Royal Air Force Sir Charles Portal, Chief of the Air Staff, this message on the third birthday of "The Eighth":—

"Through three momentous years we have watched the United States Eighth Army Air Force grow until to-day it forms with Bomber Command a great two-handed sword cutting from the west at the German capacity to wage war"

"JIMMIE" DOOLITTLE is well known to readers of *Flight*. In 1925 the Schneider Trophy Contest was flown at Baltimore, Md., and was won by Lt. Doolittle on a Curtiss-Army seaplane (biplane) at an average speed of 232.573 m.p.h. Second place was secured by Capt. Hubert Broad, on a Gloster biplane with Napier engine, at 199,169 m.p h.

Since those days Doolittle has done much flying, largely of an experimental nature, including a large share in developing blind-flying technique. In the Schneider Contest he came to be well liked by the British contingent, and when it was announced that he was to take over the command of the U.S. Eighth Army Air Force there was general satisfaction in British aviation circles. Last Sunday, January 28th, it was three years since the first members of "The Eighth" arrived in this country, and the British Broadcasting Corporation celebrated the event with a broadcast by Lt. Gen. Doolittle. We reproduce his message by courtesy of the B.B.C.:

Three years ago to-day, in an armoury in Savannah, Georgia, the Eighth Air Force was activated for service in England. Three days later, Gen. Ira Eaker and a staff of six officers were ordered here as an advance echelon.

By March 7 there were in England 19 American Air Force officers. But the strength of the Eighth Air Force in England was not 19. The strength of the Eighth in England was many thousands—for the 19 officers were quartered with R.A.F. Bomber Command, who placed at their disposal the experience, resources and personnel of that huge Air Force which even then could send a thousand bombers over Europe.

The diary kept in our early days contains hardly an entry that does not, in some way, refer to the help of the R.A.F. The headquarters for the new air force was located in close proximity to Bomber Command headquarters. British enlisted personnel was assigned to our headquarters until American personnel could be brought over; the first aircraft that the Eighth Air Force had in England was a Harvard trainer assigned to it by the R.A.F.

On paper the Eighth was a completely new air force, without a single day of operational experience, but in reality it was an old, experienced air force—for it had at its disposal every bit of knowledge gained by the Royal Air Force in two years of war.

The Eighth was the first major unit of the United States forces to arrive in England. Since then, literally millions of American soldiers have passed through here on their way to the war fronts. And now the Eighth is the largest major American unit to be based in England.

You who have seen us grow and helped us grow are entitled to a report of our accomplishments. But it is difficult to list the results of strategic bombing in figures.

We can tell you that we have despatched approximately half a million aircraft in the past three years. We can tell you that we have dropped over half a million tons of bombs on the enemy and have destroyed over 12,000 of his aircraft. We can now send as many as 3,000 aircraft over Germany on a single mission. We must also tell you that over 5,000 of our aircraft have failed to return and some 40,000 of our men have been killed or are missing.

But this does not tell the story of our accomplishments. We have worked as a team with R.A.F. Bomber Command, and the round-the-clock bombing has cut deeply into the enemy's ability to produce the material necessary to wage war. Just how much we have accomplished can best be told by the German High Command. We know that it is considerable.

Infantry units of Gt. Britain and the United States will remember each other with mutual admiration. Members of the British and American Fleets operating together throughout the world are learning each to respect the seamanship and valour of the other.

But I do not believe that among all the far-flung fronts of this war there is an example of more closely knit co-operation between forces than exists here in England between the Eighth and the Royal Air Force.

We are more than Allies. We are One.

One force, doing one job. And, with God's help, we will accomplish our purpose and aid in bringing about the one peace for which we all pray—the peace that will last for all time.

A recent photograph of Lt. Gen. Doolittle decorating Air Comdre. L. J. V. Bates, R.A.F., for meritorious conduct and performance of outstanding services.

U.S. GENERAL WENT DOWN WITH PLANE

ORDERING his crew to bale out, Brig. Gen. Frederick W. Castle, one of the U.S. 8th Air Force pioneers, died in his stricken Flying Fortress when it was shot down in flames by seven Nazi fighters near Liége.

Gen. Castle was leading the Third Air Division on Christmas Eve against Germany when, in an attack by Me 109s, two of the Fort's engines burst into flames and, in the waist, oxygen tanks ignited, threatening the bomb load. The General would not order the bombs to be jettisoned because Allied soldiers and civilians were below.

Apparently determined to be the last man to leave the aircraft, the General told the pilot to "get out," sending him forward for his parachute. The Fortress spun down to 12,000ft., where a wing fuel tank exploded, sending the bomber to destruction.

Of the crew, four who parachuted have returned safely to England. Two are in hospital and two were killed. Gen. Castle's body and the pilot's were found in the wreckage.

It was Gen. Castle's 30th combat mission. As often as possible when a difficult operation had to be flown, he "managed" to appear in the aircraft. He held the Silver Star, the Croix de Guerre (for helping the French Maquis with supplies), the Soviet Order of Kutuzov (for leading a flight of shuttle bombers from England), and the Legion of Merit.

Gen. Castle, formerly chief of supply for the Eighth Bomber Command, was at his own request transferred to a combat assignment as a Flying Fort Group Commander.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

LIGHT PLANE UPKEEP
How Much Does It Cost?

I WONDER if some of your readers who have pre-war experience of running a light aircraft, such as the B.A. Swallow, could give some approximate overhead costs and maintenance figures for an aircraft of this or similar type?

No doubt there are many pilots, at present serving in the R.A.F., who would also be interested in this information for future reference. "POTENTIAL OWNER."

PLUGGING
Another Contribution

IN reference to Mr. Stockbridge's letter in *Flight*, January 18th, may I modestly suggest that some, at any rate, of the credit for the high performance of British sparking plugs is due to the alumina from which all the insulator bodies are now made—another and little-known contribution of the British aluminium industry to the war effort.

FREEMAN HORN
(The British Aluminium Co., Ltd.).

CROPPED AIRSCREW BLADES
Equal Amputation Unlikely

WITH reference to Mr. V. H. Izart's letter in *Flight*, Jan. 18th, does he not recollect seeing a photograph of a Beaufighter which hit the Western Desert? This was featured in advertisements, I believe, and quoted the pilot's report on the behaviour of the machine, which gave no cause for alarm, in spite of metal airscrews which were severely bent.

My opinion is that provided there is no serious alteration to blade pitch, the metal airscrew should be superior under these circumstances, as it is unlikely that an equal amount of material would shear off all blades of the wooden type, whereas the blades of a metal airscrew would be unaffected so far as weight is concerned, and, therefore, balance would be less disturbed resulting in less vibration.

I believe there was another incident early in the war when a Blenheim literally flew right into the North Sea and came out again to fly safely home. This, no doubt, was not very kind to the metal airscrews.

The moral is to try to avoid flying through mud, water and sand, if possible. N. V. BRITTAIN.

HORACE SAYS . . . .
That the Rear Admiral Forgot Something

AS reported in *The Daily Telegraph* of January 27, Rear-Admiral Sir Murray Sueter, M.P., said during the previous day's aviation debate at Westminster, "We have had a lot of loose talk about carrying freight by air. A small cargo ship can carry 5,000 tons across the Atlantic. To do the same thing by air you would have to build about 1,200 airships and you would use an enormous amount of petrol."

We decided to refer this matter to our Brains Trust—in other words, to Horace, our Tame Stressman.

Horace said: "It all depends on what is meant by airships. If by airships the Rear-Admiral means airships, then further comment is unnecessary.

"On the other hand, by airships he might mean aeroplanes, just as I, in my ignorance of nautical matters, might refer to his flagboat when, of course, I really meant his flagship.

"Then it also depends upon the place from which this loose talk emanated; was it loosed off inside or outside the House?

"No responsible person in the British aircraft industry has yet made the suggestion that the freight aeroplane could compete with the cargo ship on the Atlantic run when the goods involved are the usual things, such as wheat, lumber, pulp, meat or heavy machinery. It is, however, certain that the aeroplane will eventually take across the Atlantic all the mail, most of the urgent and expensive parcels, and a steadily increasing proportion of passengers.

"But surely the Rear-Admiral has neglected in his calculations the relative speeds of cargo ships and cargo aircraft. It is true that a small cargo ship can carry 5,000 tons, and it is equally true that 1,200 aircraft or airships (what a horrible thought), each carrying 4.166 (recurring) tons of payload, would be required to move 5,000 tons overseas at one go.

"But those aircraft could make ten double trips over the Atlantic while the ship was doing one run out and home, which would reduce the number of machines required by a mere 90 per cent. at the very least.

"Because, don't forget," said Horace, "the true and complete time cycle for a double Atlantic crossing *must* include allowances for loading the ship at an English port, for unloading and loading in New York, and, finally, for unloading in England. You are then back at the point from which you started. The aircraft would be treated in the same way. Fair is fair, even as between a Rear-Admiral and a poor Stressman.

"So let us get a move on with those freight and passenger aeroplanes," said Horace, "or otherwise we shall miss that airship or whatever it is!"

Of course, mind you, that is only what our Horace says. We do not profess to understand things of that kind ourselves.

W. S. SHACKLETON.

"MONOCOQUES"
A 1915 Example for the R.N.A.S.

IN the many historical reviews of monocoque construction which have from time to time appeared, no reference is ever made to the particularly outstanding example of this class of construction developed by the late Percy Hyde Beadle, F.R.Ae.S., in the early 80 h.p. Renault-Norman Thompson biplane of 1915-16. The distinguishing feature of this machine was the copper-sewn cedar monocoque hull built in Consuta by Saunders, of Cowes.

Apart from the Consuta skin, the structure carried internal formers and stringers in the manner of what is now referred to as "monocoque" construction. The external surfaces were remarkably free from undulations and local buckling, and the diagonal planking with its copper stitching sunk flush to the surface was varnished in true boat-builder's fashion; the cedar planking thus treated, combined with the regularly spaced flecks of the copper stitching, gave the fuselage a finish which was distinctly pleasing.

Unlike so many monocoque experiments, the machine actually went into production, and examples were delivered to the R.N.A.S. at Eastbourne, Great Yarmouth, and Killingholme, etc. Mr. E. C. Gordon England did all the preliminary test flying of the machine, in the course of which it was often my pleasure to fly with him.

The R.N.A.S. nicknamed this machine the Bognor Bloater, in reference to its place of origin, the bloater-like form of hull, and the suggestion of scales created by the copper flecks down its flanks.

I feel very confident that investigation would prove these to be the first "monocoque"-fuselaged aircraft to go into production in this country, if not in the world. In any case, no review of monocoque construction can be considered complete without reference to Beadle's contribution to the story.

S. H. BOSTOCK.

IMPOSSIBILITY OF FUTURE WAR
Terrors of Liquid-gas Shells

ONE fact that emerges from the war, is that a distance of 3,000 miles is no security from enemy attack and destruction. The flying-bomb has a range of some 200–300 miles; the rocket perhaps twice that distance. But the self-propelling liquified gas shell can have an accuracy of a couple of square miles at a distance of 3,000 miles.

A gas shell, after its initial discharge, would provide for its increasing velocity by its own effluent reaction. Such a shell would consist of three hollow, streamlined, concentric cylinders. The central one would be an open venturi-shaped air passage, the outer filled with liquid oxygen, and the intermediate with liquid hydrogen. Pipes from these latter passing through expansion valves would lead to a combustion point situated in the central open venturi tube, in which the caloric energy would be utilised to expand the air rushing past and be eventually vented at about two atmospheres pressure.

This venting could be arranged to keep the shell slowly rotating on its longer axis.

The propulsive combustion would begin after the shell's discharge from its launching tube and thus continue to increase

CORRESPONDENCE

its initial velocity. It would be directed and fired at angles up to 30 deg. Its sole controlling mechanism would be a timing arrangement to cut off the propulsive gas supply at any calculated second. Upon landing, a fulminated explosion would wreck both cylinders, causing an instantaneous and terrific increase of volumetric pressure by the oxygen-hydrogen reaction. Two such shells would throw down every skyscraper in New York.

The best abutment for the cordite-charged firing tube would be to lower it to sea bottom where the water pressure would be the equivalent of lengthening the tube. The central venturi air tube would have a cap held in place by the water pressure until the shell's emergence.

Once reaching the stratosphere there are no winds or other agencies to deflect its flight, and its accuracy would be such that out of a thousand fired 3,000 miles away a minimum of eight would fall on a target of a square mile.

Against such a shell, once discharged, there is no defence other than similar retaliation. This makes future war impossible, as it would solely resolve into destruction and counter destruction of civilians.

The equations for a liquid-gas shell, for each 100 lb. are :

$$S=\frac{W}{C_L\times\frac{\rho}{2}\times V^2}=\frac{100\text{ lb.}}{0.5\times 0.00005\times 1{,}000^2}=4$$

$$\text{H.P.}=\frac{C_D\times\frac{\rho}{2}\times S\times 1{,}000^3}{550}=\frac{0.02\times 0.00005\times 4\times 1{,}000^3}{550}=0.72$$

0.72 h.p./sec. = 2,618 h.p./100 lb./hr.

$\frac{2{,}618}{1{,}273}$ = 2.056 lb. of hydrogen + 16.448 lb. of oxygen.

= 18.5 lb./hr. = 27 lb./100 lb./1,000 miles.

This leaves 73 lb. for weight of shell and fuel for extra distance and final explosion. The velocity of such explosion being 2,820 metres per second is equivalent to a 6,300 m.p.h. hurricane, a pressure which no structure could resist. The heat generated, 3,100 deg. C., would melt practically everything.

T. HAMILTON-ADAMS.

AIRBORNE LIFEBOATS

Some Pioneers in Their Development

THE descriptive article in *Flight* of January 18th, giving the history of the development of airborne lifeboats, deals graphically with a vital branch of air activity little appreciated hitherto by the public, if, indeed, many knew of its existence and importance. Following the lead in your final paragraph as to honour being given where due, I think a brief summary of the initial experimental work which was done by Cunliffe-Owen Aircraft, Ltd., will be of interest in rounding out the story.

My company, in its capacity of sister firm for Lockheed types, was first approached by M.A.P. in March, 1942, to carry out the necessary modifications to a Hudson aircraft to enable the Uffa Fox boat to be carried and released when necessary for its parachute descent. Some time previously to this, a meeting had taken place between Mr. Uffa Fox and my chief designer, Mr. W. Garrow Fisher, when the suitability of the aircraft in question to accommodate the size of boat which Mr. Fox had in mind, was given its first consideration.

Various preliminary tests were made, using full-scale space models of the boat, which were loaded with sand-bags up to the allowable weight. The first of these tests took place at Netheravon, in July, 1942—four months after the initiation of the work by M.A.P. Considerable credit must go to Mr. C. W. Bebb, at that time our chief test pilot, for being the first pilot to carry such a peculiar load and to drop it successfully within a few yards of its target. Final tests, using the real boat fully equipped, were successfully made in the Solent, starting in August, 1942.

One item on which the success of the whole venture depends —the quick-release gear which releases the parachute from the boat immediately on touching the water—was designed by our chief draughtsman, Mr. D. W. Cooper. His first design of quick release gear is now being used exclusively for both the Hudson and the Warwick lifeboats, but this will soon be replaced by a further and much improved design which Mr. Cooper has just completed, and which has successfully passed all official tests.

Incidentally, the first R.A.F. crew to be saved from the sea were rescued by an Uffa Fox boat dropped from a Hudson, and representatives from this company, together with Mr. Raymond Quilter, of G.Q. Parachutes, Ltd., and Mr. Uffa Fox, had the pleasure of entertaining these young men to a special dinner held at the Dorchester Hotel on October 1st, 1943.

There are many people to whom credit should go for the development of airborne lifeboats technique, and in addition to those already mentioned, and those mentioned in your previous article, we would like to add Sqn. Ldr. H. Myles, M.A.P.; Sqn. Ldr. A. R. Albrecht, M.A.P.; Mr. A. J. D. Crust, M.A.P., and Mr. Arthur Beaven, of this company.

I am sure that Messrs. Vickers Armstrongs, Ltd., could add a few more who were intimately connected with the introduction of the Warwick as an Air/Sea Rescue vehicle.

M. J. H. BRUCE,
Managing Director, Cunliffe-Owen Aircraft, Ltd.

A CIVIL POWER PLANT

Air Flow Over the Wing

LATE though it may seem, I would like to refer back to Mr. Pollitt's article in *Flight* dated December 7th. On page 617, two diagrams appeared showing the hot air from the rads, leaving in an upward direction, above the wing, from a point just behind the leading edge.

I am not an aeronautical expert, but, being interested, I would like to know whether this arrangement will produce any undesirable feature by introducing this flow of hot air where the partial vacuum, producing lift, would be starting.

Furthermore, if I remember rightly, it was considered that the underslung arrangement of the Lancaster's Merlins, leaving the upper wing surface uninterrupted, led to better wing efficiency. The arrangement shown in the article *would* interrupt the leading edge and upper wing surface.

Incidentally we have been told that a well-ducted radiator produces a thrust, which would largely offset the resistance of that radiator. Therefore, it would seem a debatable point as to whether or not this "new" position for the radiator would be justified.

H. M. ABSOLON.

BOOK REVIEWS

British Aircraft, Vol. II, by R. A. Saville-Sneath. Penguin, 5s.

THIS work presents a comprehensive yet concise review of civil and military aircraft built in Britain during the past ten years, and the contents of each volume is divided into groups on a constructional basis. Thus Vol. I was devoted almost entirely to "Aeroplanes—Monoplane Landplanes," and Vol. II opens with Group II, "Aeroplanes—Biplane Landplanes," which is sub-divided into four section according to the number of engines. Groups III and IV cover monoplane and biplane seaplanes and amphibians, and the rest up to Group VIII deal with gliders, rotoplanes and helicopters, jet-propulsion aircraft and, finally, airships. Aircraft engines have a section to themselves.

In short, this volume and its predecessor form a handy catalogue of familiar British types embracing a useful amount of "gen," and just to show the difficulties and delays which to-day beset the placing of such a work before the public, Group VII's text on jet-propulsion (which reproduces illustrations from *Flight*) includes the following guarded statement: "The inclusion in the present volume of a brief introduction to the subject does not imply the existence of British-built jet-propelled aircraft." Yet the great "Whittle story" had broken several months before this volume's publication date!

With Wingate in Burma. By David Halley. William Hodge and Co., Ltd. 7s. 6d.

THE exploits of the Chindits last year have almost made one forget the former Wingate episode in Burma the year before, when a tough lot of men penetrated on foot behind the Japanese lines in Burma, and were maintained by supplies dropped from the air. The story of part of this extraordinary adventure has now been told by a sergeant of the party with a gift for good and graphic writing.

Of course, everything depended on the foot parties keeping in wireless touch with the base, and arranging when and where the next dropping of supplies should take place. On ordinary days the party would march some 35 miles through the jungle; but when they had to reach a pre-arranged dropping place they sometimes had to do far more than this. There were scraps with the Japanese every now and then, and the crossing of the Chindwin and Irrawadi rivers was always a problem. On the return journey the party's last mule, which carried the wireless set, died, and then all links with base were lost. The author's party had to march for several days without food at all, until they met a British patrol. Nobody will be able to read Sgt. Halley's account of it without admiration for grand work and enjoyment of a good book.

SERVICE AVIATION

COLD WORK: Bombing-up Mitchells under the recent icy conditions was no easy task for the ground crews of Second T.A.F.

Royal Air Force and Fleet Air Arm News and Announcements

Promotion

GENERAL DUTIES BRANCH.

Group Capt. H. A. CONSTANTINE, C.B.E., D.S.O., is granted the act. rank of Air Vice-Marshal, Jan. 16th, 1945.

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following awards:—

For distinguished services in the planning and execution of a successful air strike at Nancowry and a bombardment of Car Nicobar:—

Distinguished Service Cross

Lt. (A) J. B. EDMUNDSON, R.N.
Temp. Sub. Lt. (A) I. L. GRAVE, R.N.V.R.
Temp. Sub. Lt. (A) E. T. WILSON, S.A.N.F.(V).

THE KING has been graciously pleased to approve the following award:

B.E.M. (Mil.)

P/O. Air Mech. (L) D. S. GILES, for enterprise and skill while serving in H.M.S. *Vindex* escorting convoys to North Russia.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations.

Bar to Distinguished Service Order

Act. Wing Cdr. J. R. BALDWIN, D.S.O., D.F.C., R.A.F.V.R.—Wing Cdr. Baldwin was appointed wing commander (Flying) of a wing in June, 1944. He has, in addition to planning the major portion of the operations undertaken by the wing, led over 100 successful wing and squadron missions, directed against a wide variety of targets. These have included enemy tanks, railway communications and shipping, and enemy gun positions menacing our troops. Under his brilliant leadership, the wing has destroyed or severely damaged over 800 fighting vehicles, thus contributing in no small measure to the rout of the enemy in the Falaise Gap. Wing Cdr. Baldwin has destroyed three enemy aircraft in combat since the invasion, bringing his total victories to at least 16 destroyed. Immediately prior to the invasion, he planned and completed the operations against enemy Radar installations, which paved the way for the landing of our forces by enabling them to achieve complete surprise. Throughout this period Wing Cdr. Baldwin has planned in a masterly manner and led brilliantly a vast number of missions, many of which have been in direct support of the Army and have decisively affected the course of the battle.

Distinguished Service Order

Sqn. Ldr N. BICKNELL, D.F.C., R.A.F.V.R.—This officer has completed a very large number of sorties since being awarded the D.F.C. Many of his assignments have necessitated flights far into enemy territory, often in adverse weather. He has at all times displayed the highest standard of skill and resolution and his example has been well reflected in the efficiency and success of his flight. This officer has rendered exceptional service.

Act. Sqn. Ldr. G. E. FAWKE, D.F.C., R.A.F.V.R., No. 617 Sqn.—This officer has completed a very large number of sorties, many of them against dangerous and difficult targets. He has shown the greatest determination in pressing home his attacks, often in the face of bitter opposition, and the accuracy of his bombing has been proved by the excellent photographs taken. This officer has displayed exceptional leadership, great courage and zeal. His record is outstanding.

Act. Sqn. Ldr. C. D. KEIR, D.F.C., R.A.F.V.R., No. 9 Sqn.—Since being awarded the D.F.C. this officer has completed many successful sorties. He has continued to display the highest standard of courage and resolution and his sound leadership, good judgment and great skill have greatly impressed all. In addition to his work in the air, Sqn. Ldr. Keir has rendered yoeman service in the training of other members of the squadron.

Act. Sqn. Ldr. MCKEAND, D.F.C., R.A.F.V.R., No. 692 Sqn.—This officer has completed a very large number of sorties involving attacks on a wide range of heavily defended targets in Germany. He has displayed conspicuous gallantry and determination in pressing home his attacks and has set an example of a high order. His achievements have been worthy of the highest praise.

Act. Sqn. Ldr. J. W. PERRY, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—This officer is a highly efficient pilot and captain of aircraft. He has completed two tours of operational duty, during which he has attacked a wide variety of enemy targets. His successes are a splendid tribute to his outstanding ability, great personal courage and iron determination. His example both in the air and on the ground has been most inspiring.

Act. Sqn. Ldr. G. L. MANDENO, D.F.C., R.A.F.V.R., No. 139 Sqn.—This officer has set a fine example of skill and gallantry in operations against the enemy. He has completed a very large number of sorties including 12 attacks on the German capital. He has displayed courage and determination of a high order.

Flt. Lt. H. A. BROWN D.F.M., R.A.F.V.R., No. 578 Sqn.—This officer has completed a second tour of operational duty during which he has attacked many heavily defended targets in Germany. Throughout he has displayed the highest standard of skill and gallantry, qualities which have inspired all with whom he has flown. He is a most efficient flight commander whose fine leadership and unswerving devotion to duty have contributed in good measure to the success of the formation he commands.

Act. Sqn. Ldr. J. A. HARRISON, D.F.C., R.N.Z.A.F., No. 76 Sqn.—This officer has completed two tours of operational duty, during which he has attacked a wide variety of targets, many of them far into enemy territory. He has set a magnificent example of skill, gallantry and devotion to duty, qualities which have been well illustrated in the high standard of operational efficiency of the flight he commands. On a recent occasion, Sqn. Ldr. Harrison led a large formation of aircraft in an attack against Scholven Buor. By his outstanding skill this officer contributed in good measure to the results obtained.

Act. Sqn. Ldr. A. W. G. COCHRANE, D.F.C., R.N.Z.A.F., No. 156 Sqn.—This officer has displayed the highest standard of skill and courage in operations against the enemy. He has completed a very large number of sorties, involving attacks on a wide range of enemy targets and throughout has displayed outstanding determination and devotion to duty. On a recent occasion, Sqn. Ldr. Cochrane participated in an attack on the airfield at Eindhoven. His accurate and determined bombing in the face of concentrated anti-aircraft fire set a very fine example. His achievements have won great praise.

Act. Sqn. Ldr. B. A. BURBRIDGE, D.F.C., R.A.F.V.R., No. 85 Sqn.

Flt. Lt. F. S. SKELTON, D.F.C., R.A.F.V.R., No. 85 Sqn.

These officers are pilot and observer of aircraft respectively. They have completed a very large number of sorties and throughout have displayed keenness and devotion to duty of the highest standard. They have destroyed 14 enemy aircraft, four of them during a recent sortie at night. This feat well illustrates their superb skill and unbeatable determination.

Act. Flt. Lt. P. L. U. CROSS, D.F.C., R.A.F.V.R., No. 139 Sqn.—This officer has set a fine example of keenness and devotion to duty. He has participated in a very large number of sorties, most of which have been against such heavily defended targets as Berlin, Hamburg, Ludwigshaven and industrial centres in the Ruhr area. He is a brave and resolute member of air-

SERVICE AVIATION

craft crew, whose exceptional navigational ability has been an important factor in the successes obtained. His services have been of immense value.

Capt. E. N. CATHERINE, S.A.A.F., No. 142 Sqn.—This officer has taken part in many hazardous sorties, always displaying exceptional courage, coolness and presence of mind, in the face of danger. In August, 1944, he was detailed to bomb an oil refinery at Ploesti. The attack was successfully completed but, over the target area and on the return flight, fighter opposition was encountered. Severe damage was done to the bomber by a burst of cannon and machine gun fire. Both engines stopped and a fire broke out in the fuselage which ignited the ammunition. The intercommunication and lighting systems were rendered useless. Capt. Catherine was severely wounded in the left leg, head and right arm. The aircraft dived out of control for about 4,000 feet, but by a supreme effort he succeeded in regaining sufficient control to enable his crew to abandon it. Capt. Catherine remained in his seat till all had gone and, only with great difficulty, succeeded in escaping himself by the front hatch. His great presence of mind and courage saved the lives of his crew on this occasion. Throughout his tour, Capt. Catherine has encountered many dangers, in the shape of adverse weather and enemy opposition. On another occasion his aircraft was wrecked by striking an electric cable. By his coolness, he enabled his crew to escape on this occasion also. His courage and determination have always been an inspiration to all in the squadron.

Act. Sqn. Ldr. J. TEKLOOT, R.A.A.F., No. 249 Sqn.—Sqn. Ldr. Tekloot has commanded No. 249 Sqn. since June, 1944, during which time three aircraft have been destroyed in the air and 13 on the ground, in addition to a large number of mechanical vehicles, locomotives and other transport. This officer has led a large number of the sorties, during which these outstanding results have been attained. He is not only a pilot of great distinction, but by his leadership and example the squadron has maintained a high level of morale and efficiency.

Act. Wing Cdr. M. J. A. SHAW, R.A.F.O., No. 69 Sqn.—This officer is at present engaged upon his third operational tour. During his first and second tours of duty he completed numerous sorties from the United Kingdom and Malta, taking part in torpedo bombing and sea mining operations, often in the face of severe opposition. With his present squadron, firstly as flight commander and latterly as squadron commander, he has completed his new duties of reconnaissance by night with the utmost enthusiasm and skill. His wide experience of night operations has been invaluable. He has set a fine example and obtained outstanding results.

Act. Sqn. Ldr. C. F. BRADLEY, R.A.F.V.R., No. 127 Sqn.—This officer has served continuously in operational squadrons since July, 1941, except for two short breaks. He has participated in operations from the United Kingdom, including the Dieppe combined operation, the Middle East and, since May, 1944, over north-west Europe. During this time he has destroyed at least one enemy aircraft and has also attacked large numbers of "E" boats, trains and ground installations. Sqn. Ldr. Bradley has proved himself a very fine squadron commander. He has taken part in many power dive attacks, sorties against ground targets, and long-range escorts to bombers. His outstanding leadership has been reflected in the high standard attained by his squadron, both in the air and on the ground.

Bar to Distinguished Flying Cross

Flt. Lt. P. H. CUTCHEY, D.F.C., R.A.F.V.R., No. 7 Sqn. (with effect from October 5th, 1944).—Flt. Lt. Cutchey has completed many successful sorties since the award of the D.F.C. He has continued to display outstanding enthusiasm and determination as a bomb aimer. His reliability, courage and devotion to duty have always inspired confidence in his crew.

Act. Flt. Lt. H. G. E. HEMSWORTH, D.F.C., R.A.A.F., No. 582 Sqn.—This officer has completed a very large number of operational missions. Among his recent assignments, Flt. Lt. Hemsworth has attacked such heavily defended targets as Duisburg, Wilhelmshaven, Stuttgart and Bochum. In October, 1944, this officer captained an aircraft detailed to attack Cologne. When approaching the target considerable anti-aircraft fire was encountered. Nevertheless, Flt. Lt. Hemsworth maintained a long straight bombing run to attack the target with accuracy. His aircraft sustained damage but he flew it to base. This officer has invariably displayed a high degree of skill and courage and his appreciation of the responsibilities entrusted to him has set a very fine example.

F/O. J. A. L. LYMBURNER, D.F.C., R.C.A.F.—F/O. Lymburner and Flt. Lt. McLaren, as observer and pilot respectively, were detailed for a reconnaissance far over enemy territory. The complete success achieved on this difficult assignment reflects the greatest credit on the skill, courage and determination displayed by these members of aircraft crew.

Act. Sqn. Ldr. A. T. LEANING, D.F.C., R.A.F.V.R., No. 540 Sqn.—Since the award of the D.F.C. this officer has completed numerous reconnaissances. These include flights to Trondhjem, Posen, Berlin, Dresden and Munich. On one occasion in April, 1944, he flew to Italy photographing targets in the Leipzig, Dresden and Regensburg areas. The following day he completed a reconnaissance of Belgrade, Sofia and other targets and, on the next day he flew back to the United Kingdom obtaining photographs of targets in France en route. During July, 1944, Sqn. Ldr. Leaning flew on some important reconnaissances of railway targets in France. This entailed flying at low altitudes in the face of heavy anti-aircraft fire. Despite this and adverse weather, all his missions were successfully accomplished. This officer has consistently displayed outstanding determination and fine airmanship while as a flight commander, he has formed his flight into a highly efficient operational unit.

Distinguished Flying Cross

Act. Sqn. Ldr. A. L. LAW, R.A.F., No. 680 Sqn.
Act. Sqn. Ldr. A. A. MELVILLE-JACKSON, R.A.F.V.R., No. 205 Sqn.
Act. Sqn. Ldr. C. A. H. C. OGILVIE, R.A.F.V.R., No. 47 Sqn.
Flt. Lt. W. A. DOWNES, R.A.F.V.R., No. 355 Sqn.
Flt. Lt. P. H. GARRITY, R.A.F.V.R., No. 644 Sqn.
Flt. Lt. M. J. WRIGHT, R.A.F.V.R., No. 19 Sqn.
Act. Flt. Lt. J. GARDEN, R.A.F., No. 126 Sqn.
Act. Flt. Lt. W. N. JUDD, R.A.F.V.R., No. 159 Sqn.
F/O. W. St. G. CHANDLER, R.A.F.V.R., No. 680 Sqn.
F/O. J. P. HUDSON, R.A.F.V.R., No. 38 Sqn.
F/O. S. L. HUTT, R.A.F.V.R., No. 113 Sqn.
F/O. R. W. LOWE, R.A.F., No. 680 Sqn.
P/O. F. H. BURNETT, R.A.F.V.R., No. 7 Sqn. (with effect from August 24th, 1944).
W/O. R. G. WAPSHOTT, R.A.F.V.R., No. 47 Sqn.
Act. Sqn. Ldr. K. V. INGHAM, R.A.A.F., No. 230 Sqn.

Air Marshal Sir Guy Garrod, O.B.E., M.C., D.F.C., who is now Allied Air C.-in-C., S.E. Asia. He succeeds the late Sir Trafford Leigh-Mallory.

P/O. M. B. MURPHY, R.A.A.F., No. 159 Sqn.
Act. Sqn. Ldr. G. H. BAYLY, R.C.A.F., No. 413 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. J. R. GOWANS, R.C.A.F., No. 413 (R.C.A.F.) Sqn.
Flt. Lt. D. E. FORSYTH, R.C.A.F., No. 418 (R.C.A.F.) Sqn.
Flt. Lt. J. D. HOPKINS, R.C.A.F., No. 113 Sqn.
F/O. D. N. MCINTOSH, R.C.A.F., No. 418 (R.C.A.F.) Sqn.
Flt Lt. F. L. LOMAS, R.A.A.F., No. 680 Sqn.
Flt. Lt. L. S. MELLOR, R.A.A.F., No. 680 Sqn.
Act. Flt. Lt. K. P. ALCORN, R.A.A.F., No. 159 Sqn.
Act. Flt. Lt. W. S. QUINN, R.A.A.F., No. 159 Sqn.
F/O. D. McC. ANDERSON, R.A.A.F., No. 177 Sqn.
F/O. R. S. HOBWOOD, R.A.A.F., No. 177 Sqn.
P/O. J. D. SANDELANDS, R.A.A.F., No. 159 Sqn.
Flt Lt. B. C. DAYMOND, R.A.A.F., No. 628 Sqn.
Flt. Lt. J. S. FIFIELD, R.A.F.V.R., No. 169 Sqn.
Flt. Lt. J. A. M. HADDON, R.A.F.V.R., No. 604 Sqn.
F/ O. R. E. J. FITZGERALD, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
F/O. S. P. SEID, R.C.A.F., No. 418 (R.C.A.F.) Sqn.
F/O. J. B. F. BRETHERTON, R.N.Z.A.F., No. 644 Sqn.
Act. Flt. Lt. T. A. BARKER, R.A.F.V.R., No. 76 Sqn.
F/O. E. G. FILLMORE, R.A.F.V.R., No. 115 Sqn.
F/O. A. M. SAUVE, R.C.A.F., No. 514 Sqn.
F/O. E. E. WILLIAMS, R.A.A.F., No. 514 Sqn.
Act. F/O. C. D. ANDREWARTHA, R.A.F., No. 115 Sqn.
Act. F/O. G. L. DOWLING, R.A.A.F., No. 76 Sqn.
Act. F/O. G. E. WILLIAMSON, R.A.A.F., No. 186 Sqn.
P/O. W. L. MIDDLETON, R.A.F.V.R., No. 578 Sqn
Flt. Lt. P. F. MALLENDER, R.A.F.V.R., No. 627 Sqn.
Flt. Lt. D. R. MOWARD, R.A.F.V.R., No. 239 Sqn.
F/O. F. A. W. CLAY, R.A.F.V.R., No 239 Sqn.
F/O. A. J. OWEN, D.F.M., R.A.F.V.R., No. 85 Sqn.
F/O. J. S. V. MCALLISTER, D.F.M., R.A.F.V.R., No. 85 Sqn.
F/O. J. S. REED, R.A.F.V.R., No. 138 Sqn.
Act. F/O. H. L. MERRETT, R.A.F.V.R., No. 514 Sqn.
P/O. M. A. PHILLIPS, R.A.A.F., No. 78 Sqn.
P/O. H. T. WIGLEY, R.A.F.V.R., No. 138 Sqn.
Flt. Lt. R. D. MCLAREN, R.A.F.V.R.—For citation see F/O. Lymburner, D.F.C., R.C.A.F.
F/O. R. F. LIMBERT, R.A.F.V.R., No. 514 Sqn.
F/O. H. L. HALLAM, R.A.F.V.R., No. 514 Sqn.
F/O. J. W. LOWTHER, R.A.F.V.R.
F/O. E. B. BIRCHMORE, R.A.F.V.R.
F/O. E. C. OWEN, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
W/O. L. W. WOODS, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
F/O. E. P. WALLACE, R.A.F.V.R., No. 126 Sqn.
Act. Flt. Lt. S. H. MINHINNICK, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
F/O. D. BELL, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
F/O. R. L. BLUNSDON, R.A.F.V.R., No. 9 Sqn.
Act. F/O. A. F. JONES, R.A.A.F., No. 9 Sqn.
F/O. A. J. WALKER, R.A.F.V.R., No. 617 Sqn.
Act. F/O. J. R. J. M. DESMARAIS, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
Act. F/O. P. H. LEGAULT, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
Act. F/O. J. L. A. L. MARCOTTE, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
Act. F/O. G. J. QUINLAND, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
P/O. N. EVANS, R.A.F.V.R., No. 617 Sqn.
P/O. F. J. WARD, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
W/O. L. J. HAZELL, R.A.F.V.R., No. 617 Sqn.
Act. W/O. J. C. BAILEY, R.A.F.V.R. No 644 Sqn.
Flt. Lt. D. C. HENRICKSON, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
Flt Lt. T. H. J. PLAYFORD, R.A.F.V.R., No. 617 Sqn.
Act. Flt. Lt. J. R. H. GOURDEAU, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
Act. Flt. Lt. W. E. HAMILTON, D.F.M., R.A.F.V.R., No. 425 (R.C.A.F.) Sqn.
Flt. Lt. R. D. K. HEMPHILL, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. A. S. WICKINS, R.A.F., No. 16 (S.A.A.F.) Sqn. (with effect from September 9, 1944).
Act. Sqn. Ldr. R. E. WILLIAMS, R.A.F., No. 521 Sqn.
F/O. R. W. DEAN, R.A.F.V.R., No. 524 Sqn.
F/O. L. W. EDDY, R.A.F.V.R., No. 251 Sqn.
F/O. L. R. ORNELLAS, R.A.F.V.R., No. 254 Sqn.
F/O. A. THOMPSON, R.A.F.V.R., No. 236 Sqn.
W/O. S. B. HARBISON, R.A.F., No 210 Sqn.
Flt. Lt. N. M. BURFIELD, R.A.A.F., No. 544 Sqn.
W/O. G. G. CASEY, R.A.A.F., No. 10 (R.A.A.F.) Sqn.
Flt. Lt. I. JOHNSSON, R.C.A.F., No. 404 (R.C.A.F.) Sqn.
Flt Lt. R. G. KEEFER, R.C.A.F., No. 540 Sqn.
F/O. H. E. HALLATT, R.C.A.F., No. 404 (R.C.A.F.) Sqn.
F/O. J. HEBERT, R.C.A.F., No. 404 (R.C.A.F.) Sqn.
F/O. R. A. WALLACE, R.C.A.F., No. 404 (R.C.A.F.) Sqn.
P/O. A. D. GLASGOW, R.C.A.F., No. 404 (R.C.A.F.) Sqn.
P/O. J. J. TEMPLE, R.C.A.F., No. 404 Sqn.

Conspicuous Gallantry Medal (Flying)

Flt. Sgt. S. W. WALTERS, R.A.F.V.R., No. 44 Sqn.—This airman has participated in a number of sorties, including attacks on Karlsruhe, Nuremburg and Munchen Gladbach. In November, 1944, he was air bomber in an aircraft detailed to attack Homberg. In the vicinity of the target the aircraft came under heavy fire and was struck by high explosive shells. The cockpit was shattered. The pilot was killed and the flight engineer was badly wounded. Flt. Sgt. Walters promptly assisted another member of the crew to remove his dead comrade from the pilot's seat and then took over the controls. The aircraft had sustained severe damage. One engine had been put out of action, whilst the second and a third were reduced in power and vibrating badly. The hydraulic system was damaged and the flaps had edged down. Despite this, Flt. Sgt. Walters, though lesser experienced than a regular pilot, brought the aircraft to an even keel and headed for home. Although only one engine was giving full power he reached an airfield near the English coast. The aircraft was too badly damaged for Flt. Sgt. Walters to attempt to bring it down safely. He gave orders to the crew to release their dead captain by parachute and then to abandon the aircraft themselves. Not until his comrades were all clear and he was satisfied that the aircraft was headed out to sea did this gallant air bomber leave himself. His cool courage, outstanding resource and determination set an example of the highest order.

Flt. Sgt. J. C. COOKE, R.C.A.F., No. 103 Sqn.—One night in October, 1944, this airman was captain and pilot of an aircraft detailed to attack Cologne. Whilst over the target considerable anti-aircraft fire was encountered. Just as the bombs were released the aircraft was struck by high explosive shells. Much damage was sustained. The starboard rudder controls were severed. The petrol tanks were badly pierced and the contents streamed out. Within ten minutes the petrol supply became practically exhausted. By now, Flt. Sgt. Cooke had reached friendly territory. He thereupon instructed the aircrew to leave the aircraft by parachute. As he prepared to leave himself, Flt. Sgt. Cooke saw that one of his comrades still remained in the aircraft, having accidentally released his parachute inside the fuselage. Height was being rapidly lost. Nevertheless Flt. Sgt. Cooke was determined not to leave his crew member and promptly returned to the con-

PLAYTIME IN N.W. EUROPE : R.A.F. Tempest pilots hitch their sledge to a jeep on a snow-covered airfield. Rationing of sledge space appears a little unfair to back-end Charlie.

trols and attempted to effect a crash landing in a field. During his approach, with undercarriage and flaps retracted, two engines failed. Coolly and skilfully, however, this intrepid pilot achieved his purpose and effected a crash landing, incurring little further damage to the aircraft in his effort. This airman set a magnificent example of skill, courage and captaincy in most difficult and dangerous circumstances.

Distinguished Flying Medal

Flt. Sgt. P. JEZZARD, R.A.F.V.R., No. 622 Sqn.

Flt. Sgt. J. S. WELTON, R.A.F.V.R., No. 190 Sqn.

Sgt. K. WITHNALL, R.A.F., No. 40 Sqn (with effect from June 30th, 1933).

Flt. Sgt. A. BARRAN, R.A.F.V.R., No. 544 Sqn.

Sgt. E. A. MCABENDROTH, R.A.F., No. 425 (R.C.A.F.) Sqn.

Sgt. P. F. BOLDERSTONE, R.A.F.V.R., No. 429 (R.C.A.F.) Sqn

THE KING has been graciously pleased to approve the following awards.

Military Medal

L.A/C. F. A. RANGER, R.A.F.V.R.—L.A/C. Ranger was infiltrated by parachute to the Epirus area in Greece on June 11th, 1943. He was placed in charge of a wireless set and later moved to Area H.Q. as wireless operator and remained in that capacity until August, 1944.

During the period October, 1943, to January, 1944, L.A/C. Ranger operated his wireless set very close to the Germans. On October 31st, 1943, when the British H.Q., in the village of Lafina, was hemmed in, L.A/C. Ranger assisted to dismantle the wireless set, load the mules under fire, and taking advantage of cover led his part of the convoy to safety. Later in the morning of the same day, whilst operating the wireless set in the open, he came under cross machine gun fire, but once more he played a leading part in saving the equipment.

It was largely due to his initiative and prompt obedience to orders that no casualties or material damage was suffered during this difficult period. In the three months October to December, 1943, he carried out his duties so efficiently that wireless contact with Cairo was possible at all times although subjected to bad weather during forced marches through difficult country.

B.E.M. (Mil.)

A/C.2 C. LONERGAN, R.A.F.—One night in July, 1944, a Lightning aircraft overshot a runway and crashed in an upside down position, the pilot being trapped inside. Smoke was pouring from the aircraft and petrol and oil were running over the hot engines and fuselage. A/C.2 Lonergan, who is employed in the Fire Section at the station, went to the scene, and, after digging under the aircraft for approximately ten minutes, succeeded in extricating the pilot. A/C.2 Lonergan displayed courage and devotion to duty of a very high order as there was grave danger of fire and explosion.

The crest of the Air Navigation School—Recte Volare (To Fly Straight.)

Foreign Decorations

THE KING has granted unrestricted permission for the wearing of the undermentioned decorations conferred upon the personnel indicated in recognition of valuable services rendered in connection with the war :—

Conferred by the President of the United States of America

Legion of Merit

DEGREE OF CHIEF COMMANDER.

Air Chief Marshal Sir Arthur HARRIS, K.C.B., O.B.E., A.F.C., R.A.F.

Air Chief Marshal Sir Trafford LEIGH-MALLORY, K.C.B., D.S.O., R.A.F. (since deceased).

DEGREE OF COMMANDER.

Air Marshal Sir John LINNELL, K.B.E., C.B., R.A.F. (since deceased).

DEGREE OF OFFICER.

Air Comdre. J. H. T. SIMPSON, D.S.O., R.A.F.

DEGREE OF LEGIONNAIRE.

Act. Sqn. Ldr. R. M. BOMPAS, R.A.F.V.R.

Bronze Star Medal

Act. Wing Cdr. E. P. APPLETON, R.A.F.V.R.

Act. Wing Cdr. A. T. RICHARDSON, O.B.E., R.A.F.V.R.

Conferred by the Presidium of the Supreme Council of the Union of Soviet Socialist Republics

Order of Kutozov (First Class)

Air Marshal Sir Trafford LEIGH-MALLORY, K.C.B., D.S.O., R.A.F. (since deceased).

Roll of Honour

Casualty Communiqué No. 466.

THE AIR MINISTRY regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 74 are second entries giving later information of casualties published in earlier lists

Royal Air Force

KILLED IN ACTION.—F/O. T. Bolding; Sgt. J. A. J. De Angelis; W/O. I. O. Gilbert; F/O. A. T. Gill; W/O. K. P. Hill; F/O. M. L. Hogg; F/O. E. L. Hooker; Sgt. D. J. Milburn; P/O. W. H. Perry; Flt. Sgt. F. Robinson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. A. Baylis; Sgt. E. R. Claxton; Flt. Sgt. C. A. Cox; F/O. R. F. Denney; Flt. Sgt. F. A. C. Efemey; F/O. J. C. Keighley; Sgt. T. Lafferty; Sgt. E. H. Oliver; Sgt. S. J. Pope.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. I. R. L. Acton Hill; Sgt. S. Allen; Sgt. J. C. Blackmore; Sgt. C. Burton; Sgt. F. A. Cheetham; Sgt. B. Chew; Sgt. E. F. Clarke; F/O. H. T. Clarke; Sgt. R. C. Clifford; Sgt. C. Cushing; P/O. R. D. Darling; Sgt. F. E. Deavin; F/O. G. Drake; Sgt. W. M. C. Fuller; Sgt. J. E. Goss; Sgt. A. B. Hicks; Flt. Sgt. W. C. Higgs; W/O. O. H. Hill; Sgt. G. A. Hodges; Sgt. R. N. de C. Hogge; Sgt. A. I. Hosie; F/O. C. R. Leitch; P/O. T. B. Melia; P/O. A. T. Moodie; F/O. E. J. B. Moss; F/O. G. E. C. Norman; Sgt. C. O'Connor; F/O. P. W. R. Pollett; P/O. D. A. Rollin; Sgt. E. Speirs; Sgt. F. R. M. Squair; Sgt. R. Standing; Flt. Sgt. E. J. Tocher; Sgt. F. A. Watkins; F/O. N. A. Westergaard, D.F.C.; Flt. Sgt. A. J. C. Williams.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. T. Ballantyne; Sgt. J. H. Boocock; Flt. Sgt. H. E. Browne; P/O. C. W. Culling; Sgt. J. L. Mitchell; Flt. Sgt. E. P. Pope; F/O. R. W. Walker-Lutz; Sgt. V. Williams.

MISSING.—F/O. A. J. Aldridge; W/O. C. A. Anderson; Sgt. A. Archer; Flt. Sgt. J. P. Archer; F/O. P. B. Bailey; Act. Flt. Lt. R. J. L. Banks; F/O. E. W. H. Barker; Flt. Sgt. D. M. Barr; Flt. Sgt. L. F. Beattie; Sgt. E. D. Bone; Flt. Sgt. R. A. J. Brimicombe; Act. Flt. Lt. R. Brook; Flt. Sgt. U. B. Butters; Sgt. J. E. Carr; F/O. F. D. Chalkley; Sgt. R. H. Chapman; P/O. H. Clarke; Flt. Sgt. J. J. Collins; Sgt. B. J. Cooper; P/O. A. C. L. Cox; Sgt. T. J. Crabtree; P/O. D. W. Cuer; W/O. V. A. Davis, D.F.M.; Sgt. H. J. Depotex; Sgt. R. C. Dickin; Sgt. W. H. Dobson; Sgt. P. L. Dooley; F/O. W. G. Driscoll; Flt. Sgt. S. E. Dunnett; Sgt. K. M. G. Durrant; P/O. H. Easthope; P/O. G. J. Edwards; Sgt. R. Fenson; Sgt. R. V. Fishpool; Sgt. F. C. Foster; F/O. C. L. Fox; F/O. R. A. Fuller; Sgt. G. V. George; Flt. Sgt. A. M. W. Gilbert; Sqn. Ldr. J. P. Gilliard; Flt. Sgt. A. W. Gowdey; Sgt. C. G. Griffiths; Sgt. P. W. Groom; W/O. J. W. Hall; Sgt. K. J. Hamilton; Flt. Sgt. W. T. Harley; Sgt. J. L. Hartley; F/O. P. N. Hemy; P/O. I. L. W. Holloway; Sgt. D. D. Holmes; Sgt. G. A. Hubbard; Sgt. W. Hunter; Sgt. E. Hurst; Sgt. J. R. Ireland; Sgt. F. T. James; Flt. Sgt. J. Jefferies; F/O. A. J. Jenkins, D.F.C.; Flt. Sgt. J. F. Jenkins; Flt. Sgt. B. S. Kent; Sgt. M. G. Lamb; Flt. Sgt. E. G. Lambert; Flt. Sgt. W. D. Leavesley; F/O. F. Levy; Sgt. A. R. Lewendon; Flt. Sgt. P. Lunt; F/O. C. H. Luxon; Flt. Lt. N. S. McEwen; Flt. Sgt. G. M. McGuire; Sgt. A. P. Maitland; P/O. D. Mapleson; Sgt. A. Marlow; Sgt. J. G. L. Martin, D.F.M.; Sgt. S. Mason; Sgt. D. A. Matthews; Flt. Sgt. T. M. Meir; Sgt. F. Mitchell; F/O. W. S. Monger; Sgt. I. M. Morganstein; F/O. J. F. Naylor; Flt. Lt. G. W. Nixon; P/O. J. T. W. G. Norris, D.F.M.; Flt. Sgt. S. Ormondroyd; Flt. Sgt. E. E. S. Peck; Flt Sgt. W. H. T. Pettman; Flt. Sgt. A. H. J. Plastow; F/O. G. H. Powderhill; P/O. A. D. Price; F/O. R. W. Rawlins; Sgt. A. J. Ridley; Sgt. F. Ritchie; Sgt. J. Robertson; Sgt. A. Robson; Sgt. A. T. Rogers; P/O. A. C. Scott; Act. Flt. Lt. H. T. Seller; Sgt. H. Shakespeare; F/O. D. C. Shea, D.F.C.; Sgt. J. J. Sillender; F/O. G. O. B. Sinclair; Flt. Lt. C. R. Slack; Sgt. E. L. Smith; Sgt. N. Soulsby; Flt. Sgt. K. C. Spiers; Act. Flt. Lt. R. V. Stoneman; Flt. Sgt. D. G. Thomas; W/O. H. E. Turner; Sgt. V. J. Vallin; P/O. H. M. J. Vere-Hodge; Sgt. P. G. Waghorn; Act. F/O. A. G. S. Watkins; Act. F/O. R. J. Waugh; F/O. H. Wilkins; Sgt. J. Wilkinson; Flt. Sgt. A. Wilson; Flt. Sgt. T. J. C. Wilson; Sgt. G. N. Wise; Sgt. R. L. York.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. P. Ablitt; Flt. Sgt. W. P. Beaumont; Sgt. G. F. Bennett; L.A/C. C. H. Blunden; Sgt. L. W. Bowd; Sgt. G. J. Canham; Sgt. S. Darlington; Sgt. O. V. Evans; F/O. L. B. Guest; Sgt. T. W. Hunter; Flt. Sgt. J. H. P. Oates.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Act. Wing Cdr. H. G. F. Gaubert, D.F.C.; Act. Sqn. Ldr. W. G. Williams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. A. E. Ford.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. G. L. Fowler.

DIED ON ACTIVE SERVICE.—F/O. A. H. Banfield; L.A/C. C. D. Crossman; Flt. Lt. J. Forster; Flt. Lt. C. Glossop; Flt. Lt. A. A. G. Goodall; Sgt. B. Hayes-Jones; Cpl. J. W. Jameson; Flt. Sgt. J. E. Jones; A/C.2 C. Maynard; Act. Cpl. C. E. Phillips; Cpl. C. N. Rance; L.A/C. O. M. Rees; F/O. H. J. Seddon; F/O. D. F. A. F. Smith; L.A/C. R. B. B. Wakelen; A/C.1 C. Williams' A/C.2 D. J. Wingham.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. R. F. Budgen F/O. R. F. Emery; F/O. E. G. N. Mold; Sgt S. R. J. Price; Flt. Sgt. R. Smith; F/O T Southworth.

Women's Auxiliary Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Act. Flt./O. J. M. Bushby; Act. Flt./O. V. B. Qu'A. Shelly.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. R. Davis.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. W. C.

AVIATION

Andrews; F/O. B. G. S. Bradley; Flt. Sgt. J. Chandler; Sgt. R. C. L. Hoskin; Flt. Sgt. D. C. Lake; Flt. Sgt. A. F. Mason; P/O. J. Turnbull.

MISSING, BELIEVED KILLED IN ACTION.—P/O. G. S. C. Bell.

MISSING.—P/O. C. A. Black; Flt. Sgt. P. Callow; Act. F/O. K. I. Cole; Flt. Sgt. A. R. Giles; Flt. Sgt. J. M. Hulmes; Flt. Sgt. G. T. Kirby; Flt. Sgt. A. Laing, P/O. N. W. Leibhardt; Flt. Sgt. R. G. Symonds; P/O. J. J. Wherry.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. H. Mellersh.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. D. S. Cormack; P/O. S. J. J.-James.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—W/O. W. J. Martin.

Royal Canadian Air Force

KILLED IN ACTION.—P/O. M. L. Fairles; F/O. G. M. Houston; F/O. J. N. Kerry; P/O. A. J. Martin; F/O. T. I. Pervin; P/O. R. W. Smith; F/O. C. T. Storey.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. P. P. Fahie.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. W. D. Cooke; P/O. J. F. Patterson.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—F/O. N. C. McKillop.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. G. A. Argument; Flt. Sgt. E. K. Bullock; F/O. J. W. H. McEachern; F/O. R. L. Sleeth.

MISSING.—Flt. Lt. K. I. Aalborg; F/O. L. E. Anderson; P/O. J. D. Baker; F/O. P. W. Bickford; F/O. G. T. Bolderston; Flt. Lt. R. R. Boulter; P/O. C. H. Brown; Flt. Lt. G. W. Brown; Flt. Lt. P. L. Buck, A.F.C.; P/O. J. E. W. Casouette; Flt. Sgt. E. K. Carlson; Flt. Sgt. H. G. Carson; P/O. D. W. Clarke; Cpl. J. R. Coleman; P/O. A. J. R. Coombs; F/O. V. Crawford; P/O. D. Dawson; F/O. C. B. Dockrey; F/O. H. R. Dowding; P/O. K. J. Dugdale; Flt. Sgt. G. R. Dyelle; P/O. D. G. Flood; F/O. R. C. Gibbs; P/O. L. G. Hardy; P/O. T. A. Hennessy; P/O. R. S. Holland; F/O. A. N. Johnston; P/O. F. D. Laing; F/O. F. S. Le Gear; Flt. Lt. R. W. Long; F/O. S. K. McGuigan; P/O. A. S. McLean; F/O. E. J. A. MacNair; P/O. A. F. McNally; Flt. Lt. P. R. M. Mavaut; Flt. Sgt. M. F. Nelson; F/O. I. R. Potts; W/O. W. N. Procter; W/O. J. Raike; Flt. Sgt. R. B. Rennie; F/O. W. G. Scanlan; P/O. L. R. VanHorne.

KILLED ON ACTIVE SERVICE.—F/O. J. S. S. Aird; P/O. J. F. O. Cloutier; Sgt. C. P. J. Dessertine; Flt. Sgt. J. A. C. Duhamel; F/O. N. H. MacDonald; F/O. E. A. Robitaille; Sgt. P. A. Vigneault.

DIED ON ACTIVE SERVICE.—Cpl. E. V. Adams; L.A/C. G. J. Barraball; F/O. R. J. Brown; Cpl. N. W. Cant.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. L. R. Martin.

Royal New Zealand Air Force

KILLED IN ACTION.—Flt. Sgt. J. M. Adams; Flt. Sgt. G. W. Fitness; F/O. H. E. Pritchard.

MISSING.—F/O. L. W. Neale; P/O. R. J. Thornton.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. Blaylock; Flt. Sgt. L. R. Slatter.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. B. A. Burton; Sgt. T. M. Hunter.

South African Air Force

MISSING, BELIEVED KILLED IN ACTION.—Lt. R. Briggs.

MISSING.—Maj. R. L. Morrison.

KILLED ON ACTIVE SERVICE.—2/Lt. E. B. Waters.

DIED ON ACTIVE SERVICE.—Air Mech. R. G. C. Smit.

Casualty Communiqué No. 467.

Of the names in this list, 75 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. R. Baldwin; Flt. Sgt. J. W. Bates; Sgt. J. H. Bruce; Sgt. R. H. Dunkley; Flt. Sgt. D. B. Edwards; Flt. Sgt. C. W. Elliott; P/O. F. Elliott; Flt. Sgt. D. Flood; W/O. A. J. Freeman; Sgt. R. J. Heller; Flt. Sgt. W. L. Jones; Sgt. J. M. Kahle; Sgt. T. T. Sheldrick; Sgt. A. K. Stewart; Flt. Sgt. C. M. Taylor; Flt. Sgt. B. Wyatt; P/O. D. R. O'R. Shearburn.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—W/O. M. P. Campion, G.C.; F/O. A. Davis; Flt. Sgt. W. J. Dowie; F/O. B. Hamilton; Sgt. S. C. Johnson; P/O. H. Lawson; F/O. D. E. Morris; Flt. Sgt. R. N. Morrison; Flt. Sgt. W. N. Owen; F/O. M. Passmore; W/O. G. E. Shield; Sgt. L. E. Terry.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. Begg; Sgt. D. Dart; Flt. Sgt. R. Deans; Flt. Sgt. B. P. Dineen; Sgt. R. E. Drewett; F/O. H. W. Duckitt; P/O. A. F. Evans; Sgt. J. C. F. Fleming; Flt. Sgt. P. Grieve; Sgt. L. J. Lewis; Sgt. N. N. Lewis; F/O. R. E. Mair; Flt. Lt. R. H. R. Meyer; Flt. Sgt. R. J. O'Connor; Sgt. A. A. Ough; Flt. Sgt. R. A. Park; Sgt. E. Pattison; Sgt. J. Richardson; Flt. Sgt. D. S. Smith; Sgt. S. A. Thomas; Sgt. J. W. Ward; Flt. Sgt. G. S. Wilkinson; Sgt. G. A. Wilson.

WOUNDED OR INJURED IN ACTION.—Sgt. J. A. Fitzgerald; Sgt. B. A. J. Maund.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. L. V. King.

MISSING.—F/O. R. Bamberough; Sgt. J. S. Bennetts; Sqn. Ldr. C. B. Best, D.F.C.; Flt. Sgt. K. C. Bottle; Sgt. T. Brown, A/C.1 J. C. Callander; F/O. F. Cameron; Sgt. C. L. Caston; Sqn. Ldr. J. H. M. Chisholm; Flt. Sgt. M. L. Claydon; Sgt. A. J. Coburn; Flt. Sgt. S. H. Coeshott; Sgt. R. D. Cole; W/O. E. D. H. Collard; F/O. H. S. Cook; Sgt. J. W. Cox; F/O. L. J. Darby; Act. F/O. J. G. Davies; Flt. Sgt. S.-V. Davis; Flt. Sgt. H. Dickinson; Sgt. A. Dodd; Sgt. L. Duncan; W/O. J. C. Forbes; Flt. Lt. D. R. O. Ford, D.F.C.; Sgt. W. H. Francis; Sgt. A. C. D. Gent; Sgt. C. F. Gill; Sgt. J. Gill; W/O. P. L. Godfrey; Sgt. F. J. Gooch; Flt. Sgt. G. G. Griffin; P/O. P. H. Groves; Sgt. L. J. Hambly; Flt. Sgt. L. A. Harding; Flt. Lt. N. M. Harding; Sgt. E. M. Hayward; Sgt. H. W. Hazell; F/O. D. C. Heather; Sgt. A. Heckingbottom; Flt. Sgt. A. D. Heggison; Sgt. A. Hill; Sgt. S. Horder; W/O. D. T. Hughes; Sgt. N. A. B. Hughes; Flt. Lt. A. Hutchison; Flt. Sgt. J. G. Jeffery; Flt. Sgt. L. W. Langley; F/O. D. C. Law; Sgt. A. Ledger; Sgt. R. Leigh; Sgt. J. T. Leitch; W/O. A. G. Lewis; Flt. Lt. J. S. Limbert; Sgt. J. McCabe; Sgt. J. McCauley; W/O. J. S. McPhee, D.F.M.; F/O. M. M. Maguire; F/O. J. F. V. Marshall; Flt. Sgt. N. H. Mayor; Sgt. R. S. Meachen; Flt. Lt. T. S. F. Meadows; Sgt. D. W. Medlicott; Flt. Lt. D. G. Metzler; Sgt. J. G. Miller; Sgt. W. A. G. Milne; Flt. Sgt. W. C. Moss; F/O. K. J. Nethercott; Sgt. L. F. Pegg; Sgt. A. Perring; Sgt. A. E. Perry; Sgt. G. Pesticcio; Flt. Sgt. C. S. Quelch; Sgt. J. Read; Sgt. S. C. Rennie; W/O. L. F. Reynolds; Sgt. T. Roberts; Sgt. A. Rollinson; Sgt. P. J. Sands; Sgt. F. A. Saunders; Sgt. D. L. Saunders-Davies; Act. Flt. Lt. C. B. Scott; Sgt. J. E. Simkin; Sgt. G. A. M. Simpson; Sgt. A. F. Skelton; Flt. Sgt. R. V. E. Slowley; Flt. Sgt. A. W. Smelt; Sgt. J. B. Sowden; F/O. R. E. Stainbank; Sgt. C. Stapleton; F/O. G. A. Thompson; Sgt. E. T. G. Wallis; Sgt. R. B. Ward; Sgt. B. D. M. Warren; Flt. Lt. L. S. F. Watkinson; Sgt. G. Whyles; F/O. A. J. Wilcox; Flt. Lt. E. L. Wilde; Flt. Sgt. V. L. Wilkinson; P/O. R. J. Winchester; Sgt. F. G. J. Wood; Sgt. G. L. Wood; W/O. R. A. R. M. Woodhouse; Sgt. M. Young.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. H. R. Platt; Flt. Sgt. R. H. Terry.

KILLED ON ACTIVE SERVICE.—F/O. R. A. Alabaster; Sgt. G. A. Andrews; Sgt. D. H. Bates; F/O. A. A. Beard; Sgt. E. Bennett; F. A. W. Blerkom; P/O. R. Bradbury; Sgt. N. Brookes; Sgt. K. G. A. Byron; Sgt. W. S. Croxy; Sgt. G. R. Danks; F/O. G. J. Dunn; P/O. J. K. Evans; Sgt. B. J. Fouracre; Sgt. E. Foweather; Sgt. M. C. Gill; Sgt. D. O. G. Hall; Sgt. W. R. Hamilton; Sgt. H. M. Hatley; F/O. C. Haynes; F/O. J. R. Holland; P/O. M. R. Hopkins; F/O. J. L. Langford; Sgt. A. M. MacDonald; Sgt. A. McD. McIlvean; W/O. J. Murray; L.A/C. W. B. Naylor; Sgt. H. Nimmo; F/O. F. R. Offord; Flt. Sgt. T. P. Owen; Sgt. A. Padget; Flt. Lt. A. W. Ratledge; Flt. Sgt. N. Sadler; Flt. Sgt. A. Sandham; Sgt. J. E. Scott; F/O. R. Taylor; P/O. W. H. Thompson; Flt. Sgt. L. L. D. Tuck; F/O. R. Walker; Flt. Sgt. V. J. Ward; W/O. A. W. H. Watson; Wing Cdr. D. S. S. Wilkerson, D.S.O., D.F.C.; Sgt. E. H. Wilkinson; Sgt. F. G. Woodcock.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. B. Bannan; Flt. Sgt. D. J. Farrant; Flt. Sgt. A. I. G. Hunter; W/O. R. T. Lord; Sgt. R. H. F. Malthouse.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. F. Barratt; Sgt. T. Kerrigan; F/O. D. P. McLoughlin; Sgt. F. A. G. Sage; P/O. K. Shaw; F/O. A. L. Warner; F/O. R. T. Whitehead.

The crest of No. 461 (R.A.A.F.) Sqn.—They shall not pass unseen.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.2 E. W. Berry; Sgt. G. E. Bolt; F/O. R. W. Dobson; Sgt. E. N. Gladding; Sqn. Ldr. W. R. Hardeman, O.B.E.; Sqn. Ldr. F. W. Westly, A.F.C.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/C. S. Drower; F/O. J. J. M. Saunders; Cpl. S. W. A. Hill.

DIED ON ACTIVE SERVICE.—A/C.2 A. T. Blagdon Act. Flt. Lt. A. A. Bond; Cpl. I. Campbell; Act. Sqn. Ldr. A. F. Cave; A/C.2 J. Farrell; L.A/C. S. Finding; Flt. Lt. M. Hemingway; Flt. Lt. L. T. Henry; Sgt. J. F. Morrison; L.A/C. O. W. Phillips; Sgt. N. J. Stockford; Cpl. E. L. R. Strowger; L.A/C. S. W. Warner; L.A/C. S. Whitaker.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. H. T. G. Dagnall.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. J. J. Bishop; W/O. R. A. P. Crowley.

MISSING.—P/O. J. J. Condon; Flt. Sgt. L. A. Davis; Flt. Sgt. J. M. Dillon; Flt. Sgt. K. C. Donald; Flt. Lt. J. Fee; Flt. Sgt. R. H. Gawler; Sgt. W. G. McD. Geikie Flt. Sgt. A. W. Haselhurst; F/O. A. K. Hornibrook; Flt. Sgt. N. G. Hurst; Flt. Sgt. F. J. Hurstwaite; F/O. C. McCall; Flt. Sgt. C. E. Mengel; Flt. Sgt. W. A. Schultz; Act. F/O. S. J. Staples; W/O. J. B. Stinson; Flt. Sgt. C. W. Thomson.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. C. Barry; Flt. Sgt. J. H. Williams.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. McK. D. Reid.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. H. D. MacDonald, D.F.C.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. C. H. Anderson; W/O. W. S. Beatty; Flt. Sgt. G. E. P. Birch; Sgt. J. H. Brown; W/O. L. J. Burkitt; W/O. W. D. L. Cameron; F/O. J. A. Diggins; W/O. D. W. Dufton; F/O. F. A. Harman; Flt. Sgt. W. F. I. Hill; P/O. G. McI. Johnston; Flt. Sgt. G. Karcza; F/O. A. W. Little; P/O.

——AND IN S.E. ASIA : Coastal Command airmen in Ceylon pause from bathing to watch a Catalina setting out on patrol.

SERVICE AVIATION

W P. McD. McIntosh; Flt. Sgt. A. C. McLenahan; P/O. W. Martin; Flt. Sgt. F. F. Mercer; W/O. J. E. Milner; W/O. P. E. Nichols; P/O D. H. Pearson; F/O. B. A. Richmond; F/O. G. C Robinson; Sgt. P. M. Shulman; P/O. D. B. White

MISSING.—Flt. Sgt. G. S. Breckels; Flt. Sgt J. D. Campbell; Flt. Sgt. B. E. Columbus; P/O C. D. Crowe; Flt. Sgt. G. J. Dennison; P/O J. C. Gallagher; Flt. Sgt. N. M. Hurlbut; Flt. Sgt. M. Kesselman; F/O. A. L. Kirsch; P/O. J. G. G. A. Labelle; Flt. Sgt. L. G. Langley; F/O. J. E. G. LeBlanc; P/O. D. R. MacCarthy; F/O. R. E. MacLaren; P/O. H. N. McLeod; Flt. Lt. B. H. Smith; Flt. Lt. J. C. Younge.

KILLED ON ACTIVE SERVICE.—F/O. J. W. Bayard; F/O. C. E. Brooks; P/O. I. D. Olson; F/O. L. G. Peardon; Sgt. J. R. Stokes; Sgt. J. Watt.

DIED ON ACTIVE SERVICE.—Cpl. L. A. Cudmore; L.A/C. J. M. Seymour.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. H. I. Crawford.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. J. R. G. Bathgate, D.F.C.

WOUNDED OR INJURED IN ACTION.—F/O. A. M. Millar.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Act. Sqn. Ldr. G. R. Gunn.

MISSING.—F/O. R. W. Brown; Act. F/O. I. M. Campbell; F/O. F. M. Clarke; Flt. Sgt. M. J. Miln; P/O. C. W. Robbie.

KILLED ON ACTIVE SERVICE.—W/O. G. J. Forbes.

South African Air Force

WOUNDED OR INJURED IN ACTION.—Maj. J. R. R. Wells, D.F.C.

MISSING.—W/O. H. E. Horscroft; 2/Lt. O. Van Trotsenburg; W/O. J. Wilson.

KILLED ON ACTIVE SERVICE.—Capt. T. W. Cross.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Lt. R. W. Cowley.

Casualty Communique No. 468.

Of the names in this list, 68 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—W/O. M. Azouz; W/O. G. Birlison; Sgt. E. J. Dryland; Sgt. J. A. Dumaresque; Flt. Lt. R. G. Gardner; Sgt. P. I. Geddes; Flt. Sgt. J. Gibson; P/O. J. W. F. Hall; W/O. R. P. Holmes; Act. F/O. C. R. James; Sgt. R. S. Keatley; Sgt. A. H. Lucy; P/O. B. A. Majaki; Sgt. E. Mosey; F/O. O. C. Sweetman; Sgt. K. N. Talbot; Flt. Sgt. R. H. Westbrook; P/O. L. Wibberley; F/O. A. C. Wiggins.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. S. A. Swain.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. W. Ainscow; Act. Flt. Lt. L. J. Allum, D.F.M.; Sgt. J. W. Barker; Sgt. W. Belton; Flt. Sgt. M. W. Biles-Barford; Act. Flt. Lt. F. P. Burbridge; P/O. F. Crothers; Act. Flt. Lt. H. C. Eaton; Act. Sqn. Ldr. A. Gibson, D.F.C.; Sgt. W. A. Goodfellow; F/O. T. W. Jackson-Baker; Flt. Sgt. G. W. Jones; Sgt. R. G. Jones; Sgt. D. Logue; F/O. I. R. MacDonald; Sgt. J. H. McIvor; Sgt. W. McKay; Flt. Sgt. C. Mason; F/O. E. R. Mitchell, D.F.M.; Sgt. W. G. Neale; Sgt. H. A. Norton; P/O. A. W. Osborn; Flt. Sgt. K. E. Payne; Flt. Sgt. L. J. Phipps; Act. Flt. Lt. C. P. Ready; Sgt. R. R. Scotland; Flt. Sgt. C. J. Seery; P/O. C. L. L. Sherbrooke; Sgt. K. G. Smith; Sgt. A. Spurr; Act. Wing Odr. I. R. Stephenson; Sgt. T. R. Stones; Sgt. A. E. G. Thomas; Sgt. A. A. Tucker; F/O. A. J. Wakefield; Flt. Sgt. A. J. Wickersham; Sgt. S. Williams; Sgt. W. P. Wilson.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. C. F. Baldwin; Sgt. R. Boyle; P/O. R. C. Clarke; W/O. K. G. Cranefield; Flt. Sgt. B. W. Curran; Flt. Lt. E. J. Sharpe; F/O. D. F. J. Tebbit.

MISSING, BELIEVED KILLED IN ACTION.—F/O. J. R. Brodby; F/O. F. G. Burgess; Sgt. R. L. Dicken; W/O. L. C. Evans; Sgt. D. Harrison; Sgt. A. A. Humphris; Sgt. R. F. Leach; F/O. C. H. Mason; Sgt. J. L. Parker; P/O. J. S. Peacey; W/O. F. McG. Reid; F/O. C. N. West.

MISSING.—Flt. Sgt. F. Andrews; F/O. L. N. Arkless, F/O. K. J. Ayres; F/O. T. M. C. Ball; Act. F/O. W. Begg; Flt. Lt. A. O. Black; Flt. Sgt. P. E. Bode; Flt. Lt. F. Bolton; Flt. Sgt. E. A. Bradshaw; F/O. A. H. Brindley; Flt. Sgt. H. R. J. Bromley; F/O. D. Brown; F/O. P. F. Carlisle; Sgt. D. J. Carter; Sgt. R. J. Chatwin; Sgt. G. Clark; Sgt. D. O. G. Coote; Flt. Lt. H. W. Cowan; Flt. Sgt. J. M. Davies; Sgt. A. A. Dowling; F/O. A. J. Ede; Sgt. B. Fanthorpe; Sgt. P. B. Feltham; Flt. Sgt. R. W. Forrest; W/O. K. D. Fox; Flt. Sgt. R. F. French; F/O. P. W. Fry; Sgt. J. Furnival; Sgt. F. H. O. Garnett; Sgt. J. A. Gillett; P/O. J. Graham; Flt. Sgt. R. A. Hall; Sgt. J. Harman; Sgt. E. Harwood; Sgt. E. Haskins; Sgt. W. Hewson; Flt. Sgt. E. Hopkins; Flt. Sgt. W. R. Hoyle; Sgt. G. H. Hughes; Act. F/O. J. Isaac; Sgt. E. S. John; Sgt. W. Johnson; Sgt. A. D. Jones; Sgt. T. E. Jones; Sgt. R. H. Julian; Flt. Sgt. N. J. Lees; Act. F/O. L. W. Leonard; P/O. D. Levene; W/O. W. G. Lewis; Sgt. R. Litterick; F/O. J. W. Lloyd; Sgt. T. P. Lonsdale; Flt. Lt. D. K. McCuaig, D.F.C.; Flt. Sgt. E. P. McDonald; Sgt. T. H. McLean; F/O. J. A. McKay; Flt. Sgt. J. W. C. Mabbutt; Flt. Sgt. A. Marston; Sgt. J. Moreton; F/O. J. E. Morris; F/O. P. Mosby; Sgt. E. Mullan; Flt. Lt. J. C. Nixon; F/O. M. A. Oakley; Flt. Sgt. F. Ormson; Flt. Sgt. K. T. Orton; Flt. Sgt. H. Osborne; Sgt. K. R. Parkinson; F/O. I. Partington; Sgt. E. J. Patrick; W/O. T. Peacock; Sgt. W. D. Piggott; Flt. Sgt. D. H. R. Plear; Flt. Sgt. S. J. Poole; P/O. P. J. Purcell; Sgt. L. V. Ratcliffe; Sgt. E. Richardson; Sgt. J. N. Rumsby; Sgt. R. D. D. Shields; F/O. H. Smith; Flt. Sgt. D. T. Stevens; Flt. Sgt. J. K. Stobbs; Flt. Lt. J. L. Storer; Sgt. J. R. Sutherland; F/O. A. J. D. Teece; Flt. Sgt. K. T. Orton; Flt. Sgt. H. Osborne; Sgt. K. R. Parkinson; F/O. I. Partington; Sgt. E. J. Patrick; W/O. T. Peacock; Sgt. W. D. Piggott; Flt. Sgt. D. H. R. Plear; Flt. Sgt. S. J. Poole; P/O. P. J. Purcell; Sgt. L. V. Ratcliffe; Sgt. E. Richardson; Sgt. J. N. Rumsby; Sgt. R. D. D. Shields; F/O. H. Smith; Flt. Sgt. D. T. Stevens; Flt. Sgt. J. K. Stobbs; Flt. Lt. J. L. Storer; Sgt. J. R. Sutherland; F/O. A. J. D. Teece; Flt. Sgt. S. A. L. Townsend; Sgt. R. G. Tucker; Sgt. W. J. Tucker; Sgt. T. Vickers; Flt. Sgt. R. E. G. Waltrich; W/O. J. Webster; Flt. Lt. H. West; Sgt. A. S. Wheeler; Sgt. A. H. White; Sgt. F. Wilcock; P/O. J. L. Wilson; Flt. Sgt. A. Wright.

KILLED ON ACTIVE SERVICE.—Sgt. J. L. Allen; F/O. B. L. Arnold; Sgt. J. A. Bentz; Sgt. L. F. G. Bishop; L.A/C. D. Bremner; Flt. Lt. E. O. Browne, D.F.C.; W/O. K. Buckingham; P/O. K. E. A. Chappell; L.A/C. T. J. Clarke; L.A/C. E. Cox; Flt. Sgt. A. E. Davies; A/C.1 M. L. Duchemin; Flt. Sgt. P. Hodgkinson; F/O. J. G. Hodgson; Sgt. T. Huddleston; W/O. R. Jones; Sgt. E. H. Jukes; Sgt. L. H. Kilby; Flt. Lt. O. Lee; Sgt. K. Luckett; P/O. A. R. W. Milne; Flt. Sgt. E. A. Stubbs; Sgt. F. M. Tague; A/C.1 D. M. Wesson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. Anderson; Sgt. J. H. Ashcroft; Sgt. E. A. D. Barnes; Sgt. J. E. Corbett; Sgt. D. Ferguson; F/O. F. P. Graves; Sgt. E. D. Morrison; Sgt. E. R. E. Mountain; Sgt. A. F. Sutherland; Sgt. A. D. Warder; Flt. Sgt. J. F. Whitley; Sgt. J. G. Williams.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. J. M. D. Angrave; Cpl. J. Baker; Cpl. G. C. Barton; L.A/C. C. W. Bennett; Flt. Sgt. A. H. R. Browne; Act. W/O. T. J. Brownrigg; Cpl. A. C. Chatfield; L.A/C. A. L. Cook; L.A/C. O. E. Crocker; Cpl. S. W. Figures; Cpl. L. J. Finnis; L.A/C. D. A. Grass; L.A/C. D. Groves; Sgt. J. F. Harrison; L.A/C. S. Helliwell; L.A/C. F. Humphreys; L.A/C. D. W. Hunt; P/O. R. A. Hutchinson; P/O. E. W. Judges; Cpl. J. C. Lines; Cpl. A. W. Marhoff; L.A/C. D. C. Nelmes; Sgt. J. Robson; F/O. P. C. Rudd; L.A/C. A. Wheen.

DIED ON ACTIVE SERVICE.—L.A/C. C. W. Arnson; Cpl. W. A. C. Bond; A/C.1 B. Butler; Act. Cpl. S. H. Hichens; Sgt. W. A. Kavanagh; Act. Sqn. Ldr. A. May; Cpl. J. W. Raymond; L.A/C. J. H. Seddon; Cpl. R. Senior; A/C.2 J. Simpson; F/O. S. R. Smith; Cpl. V. Williams; L.A/C. H. Wright.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. T. H. Fynn; F/O. R. G. A. Harvey, D.F.M.; Flt. Sgt. K. C. Kent; Flt. Sgt. L. F. McCarney; W/O. R. R. Sanderson; Act Flt. Lt. F. Taylor.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. J. W. Fowler; Flt. Sgt. R. R. McMillan; Flt. Sgt. E. J. Stones; Flt. Sgt. R. J. Thomson; P/O. G. Tyler.

MISSING, BELIEVED KILLED IN ACTION.—P/O. R. J. Acres; P/O. N. J. Bowman.

MISSING.—Flt. Sgt. R. C. Brookman; W/O. B. G. D. Dillon; W/O. S. G. Lee; P/O. M. McHugh; P/O. E. Ray; P/O. S. W. Smith; Act. Flt. Lt. A. B. L. Tottenham; W/O. L. W. Wheeler.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. D. Jones.

DIED ON ACTIVE SERVICE.—A/C.1 L. L. Harris.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. R. J. McCleery; P/O. P. A. Thomson; Flt. Sgt. J. F. Wood.

TAKING IT ON THE CHIN: This French Marauder of First T.A.F. had a faulty nose-wheel. The pilot landed it well on two wheels, but it nosed down on coming to rest.

Royal Canadian Air Force

KILLED IN ACTION.—P/O. T. J. Brennan; F/O. G. R. Duncan; Flt. Lt. J. J. Flood; F/O. A. Gaddess; Flt. Sgt. W. R. Karstens; F/O. W. G. Layng; F/O. G. D. McLeod; Sgt. T. B. Tierney; Sgt. D. A. Trott.

WOUNDED OR INJURED IN ACTION.—Flt. Lt. R. E. Curtis, D.F.M.; F/O. F. R. Darling; P/O. P. J. W. Gosson.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Lt. J. A. Woodward.

MISSING, BELIEVED KILLED IN ACTION.—P/O. D. A. Webb.

MISSING.—F/O. J. S. Blair; Flt. Lt. H. E. Brown; F/O. G. G. Bryan; Flt. Sgt. J. F. W. Clarke; Flt. Lt. R. Clasper; W/O. A. McN. Cleland; F/O. C. H. Cressman; F/O. J. E. Cornelison; P/O. R. J. Delmage; Flt. Sgt. T. A. Harrington; Flt. Lt. R. E. Holness; P/O. P. E. Hurtubise; W/O. L. G. McKinnon; P/O. K. A. McLaughlin; Sqn. Ldr. H. W. McLeod, D.S.O., D.F.C.; W/O. F. S. Martin; Flt. Lt. G. G. Millar; P/O. J. A. Nadeau; P/O. H. I. Shepherd; F/O. P. Steffin.

KILLED ON ACTIVE SERVICE.—Sgt. T. S. Buchkowski; Sgt. J. W. Fraser; L.A/C. M. D. Goss; Flt. Sgt. R. W. G. Henry; F/O. J. F. Muir; Sgt. J. L. Oliver.

WOUNDED OR INJURED ON ACTIVE SERVICE.—W/O. E. H. M. Richards.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED PRISONER OF WAR.—F/O. C. Rudyk.

Royal New Zealand Air Force

KILLED IN ACTION.—Flt. Lt. F. N. Shallcrass.

PREVIOUSLY RPEORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Act. Flt. Lt. J. R. Petrie, D.F.C.

MISSING.—P/O. N. B. Couper; Flt. Sgt. G. W. H. North; F/O. T. Wyllie.

South African Air Force

MISSING.—W/O. P. Angove; Lt. R. B. Kellar; Lt. G. McFie; W/O. J. C. Rogers; Lt. A. Shepperson.

KILLED ON ACTIVE SERVICE.—2/Lt. A. Brits; Lt. T. W. Ection; Sgt. D. B. Malan; Lt. K. M. Todd.

PREVIOUSLY RPEORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Capt. T. G. Murphy.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Lt. I. H. Y. Dalton.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Lt. I. Declerk.

DIED ON ACTIVE SERVICE.—Air Mech T. Boths; Air Mech. J. D. Seward.